WOMEN'S SEXUAL PAIN AFTER CHILDBIRTH: DEVELOPMENT OF A SOMATIC MODEL FOR SCAR TISSUE REMEDIATION, EDUCATION AND MANAGEMENT

by

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This dissertation is dedicated to the memory of my mother Sarah who encouraged creativity accompanied by discernment. My father WB Heed was a passionate researcher. He pursued rigor and accuracy as a way of life, nonetheless demonstrating a fine balance between the scientific method, original thought, and intuition. I hope and believe my parents would have been proud of my efforts to embody their values.

I also dedicate this dissertation to my life partner Bob, whose unwavering support, encouragement, and endless kitchen labors allowed this work to find completion. Finally, I would like to dedicate this dissertation to Dr. Vincent Medici, who suggested the pursuit of a graduate education. His faith in my abilities exceeded my own, and my academic journey would not have occurred without him.

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Scar tissue after childbirth is largely unrecognized as causative in the gynecology, urology, physical therapy, and psychotherapy settings where women seek help for painful sex. Despite available pelvic therapies to address physical scar tissue, women lack accurate genital vocabulary and self-permission when describing vaginal and vulvar pain(s) related to birth injuries. This contributes to unresolved emotional trauma, an aspect of sexual pain, which persists unaddressed. Two Sexological Bodyworkers undertook a preliminary critical investigation of birth-related scar tissue and its treatment, using mixed qualitative methodologies, including action research and intuitive inquiry. Research identified effects of scars related to sexual pain by excluding confounding factors. Our research model predicted that once pain from biochemical, biomechanical, and emotional origins was ruled out, scars must be at cause. In a convenience sample of 12 women, treatment protocols included somatic sex education, hands-on scar tissue remediation techniques, and manual self-help training. Our primary investigation was whether mindful palpation and treatment of scar tissue had potential to cause immediate

dramatic, and positive tissue change. Inquiry also included whether and how sexual pain from scar tissue might resolve as a result of somatic recall. Four of 12 subjects experienced one or more potent episodes of somatic recall, which immediately preceded rapid, dramatic changes in density and viscosity of scar tissue. Of 12 subjects, 10 completed the research protocol, providing feedback. All 10 subjects reported nearly complete cessation of sexual pain and/or significant improvement in sexual sensation that occurred during or within 4 weeks of participation in this research.

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CHAPTER 1

PROBLEM FORMULATION

Introduction

Scar tissue is a largely unseen and unacknowledged problem, as is the sexual pain experienced by many women who have given birth. This dissertation is undertaken to provide insight into the relationship between birth-related scar tissue and sexual pain. While this dissertation seeks to reveal both the cause-and the effect-relationships between sexual pain and birth-acquired scars, it also seeks to provide a genuinely holistic model for scar tissue remediation, education, and management. This novel approach to scar tissue remediation is based on the successful remediation of scar-related sexual pain after childbirth for one woman, who then partnered with the author for this research project.

Scars are often overlooked for their contribution to a wide variety of pains and dysfunctions across all body systems. This was first brought to my attention in 1998, by Dr. Vincent Medici, DC. At that time Dr. Medici was the curriculum director at the Shiatsu Massage School of California (SMSC) in Santa Monica. Over a period of 10 years, he served as my mentor there in bodywork and orthopedic evaluation. He tutored me individually; and in the anatomy, pathology, and pain assessment classes he eventually handed over to me to teach, he taught that unresolved scar tissue was an essential obstacle to the attainment of radiant health. He repeatedly emphasized that scar tissue, especially birth-related scar tissue, was a primary inhibitor of the free movement of life force energy throughout the body, expressed in this learning context as *qi*.

In addition to his contribution as curriculum director at SMSC, Dr. Medici taught anatomy, physiology, pathology, and orthopedic evaluation of pain syndromes. After close individual tutelage, Dr. Medici turned the majority of his instructional duties over to me. I served as anatomy, pain, and orthopedic evaluation, craniosacral technique, and physiology/pathology instructor at SMSC for 12 years (2000–2012).

In Chinese Medicine, as well as Shiatsu theory, two crucial meridians, subtle rivers of energy, or *qi*, run through the midline of the body. One meridian runs down the front of the body from crown to perineum, and the other up the back of the body, from perineum to crown. These meridians meet in the head and at the perineum. According to Medici, problematic interruption of *qi* flow, especially in the perineum where these two channels meet, typically goes unnoticed and untreated.

Anatomically, physical blockages occur within the connective tissue continuum of midline (lineal alba) and pelvic floor (perineal body) structures. Scar tissue accumulates and blocks these structures from birth-related injuries and surgeries, including C-sections, tears to the perineum, and episiotomies (Medici, 2011a). At the Shiatsu school, in radio broadcasts, and in holistic healthcare lectures, Medici teaches that the scars interrupt the flow of *qi* in these important energy channels and have the potential to dysregulate the entire neuroendocrine system (Medici, 2011a, 2016c, 2017).

Dr. Medici often referred clients to me for bodywork. Over time he began to refer clients with birth-related scar tissue. Several women he referred had various neuroendocrine disorders, including one with brain cancer (then in remission). In pathology classes as well as in private conversations, he emphasized that the primary origin of these issues was midline *qi* disruption.

My assignment was to use bodywork to restore the flow of *qi* to the meridian system for these clients. Eventually I learned how to do so; this allowed me to sense when birth, or gynecological-related scar tissue, was at cause when encountering women with a broad variety of physical complaints. I learned to sense when scars were primary causes for their unusual symptoms, how to palpate them physically, and to remediate the blockage they caused, thus returning the body to a healthier state of function.

In one case, I met a 50-year-old woman who complained of a complete loss of both sexual desire and function. She attributed this loss to a complete hysterectomy that had taken place 12 years previously. As an acupuncturist herself, she thought that low hormonal function (deficient yin *qi*) was at cause for her lost libido and ability to lubricate sexually. I heard her story, and my inner eye saw that it was scar tissue wrapped around her psoas muscles (deep hip flexors), that was actually at cause for her lost libido. I sensed that her issues were unrelated to deficient hormones, although she had no ovaries.

We were both attending a craniosacral retreat, in the tradition of Visionary Craniosacral Work (VCSW), created and taught by Scottish osteopath Hugh Milne. The development of intuitive perception is central to Milne's approach to teaching VCSW. In his visionary tradition, Milne places a profound emphasis on knowing anatomy in sufficient depth that practitioners are able to "see" all structures targeted for therapy, accurately in their mind's eye, prior to beginning work with them.

When I "looked" into this woman's body, I could not miss the mass of gnarled, adhesive scar tissue entwining her right psoas muscle. I suggested deep bodywork to address this scar tissue, with the intention of testing the veracity of my inner-eye

perception. I told myself that if bodywork was successful, returning normal sexual function to this woman, then I had perceived accurately. Bodywork was quite unlikely to correct hysterectomy-related hormonal imbalance, such that normal sexual function would spontaneously return, especially after being absent for 12 years since her gynecological surgery.

We made time for a series of three sessions. After deep psoas work during her first session, this woman came to our second session wearing a big grin, announcing that she was feeling a distinct return of sparks of sexual desire. After her second psoas scar tissue session, she was lubricating normally during self-pleasure. After her third session, she reported that she was once again fully orgasmic. This process took place over a period of 10 days. She noted that it seemed a quick fix after 12 years of sexual dysfunction. I felt validated and intrigued by this experience and decided to pursue scar tissue remediation in earnest.

In the context of this dissertation and in order to contextualize sexual pain related to scars, a critical investigation was mounted that used a holistic theoretical model for research. This model defines radiant health as a birthright for every individual. According to the model, there are four essential domains of health. Within one of these domains, a variety of systemic problems in physiologic function are understood as created by unresolved scar tissue. There are three other domains in this model, which include imbalanced blood biochemistry, poor body biomechanics, and emotion that becomes internalized as muscular tension. As obstacles to radiant health, each of these domains can be assessed via visual observation and skilled palpation. Use of this model satisfied

our need to identify, isolate, and keep scar tissue central to our inquiry. Scar tissue is an essential obstacle to healthy and pain-free sexual function.

My training with Dr. Medici included many hours spent observing his assessment and treatment of clients and SMSC students, during which I was able to study the relationship between the each of the four domains and health problems of all kinds. These problems were frequently resolved by applying therapy effectively, in the correct sequence within each domain. Suggestions for nutritional improvement, acute listening skills, emotional release bodywork, and general health counseling were used according to needs of each particular client. Instruction in self-help applications of healing oils and clays, as well as the use of direct hands-on tissue manipulation, was offered for scar–related problems.

Dr. Medici developed the model of four domains of functional health. This model was in use at the Shiatsu school from 1996 until the school closed in 2012. Medici's model of four essential domains of health, which he called The Rule of Four, was central to his process of pain and orthopedic assessment. He taught the Rule of Four in order to inform clinical inquiry and expand the scope of effective practice for manual therapists whose styles included Shiatsu, emotional release work, and structural manipulation through the use of deep tissue massage. I have adapted Medici's Rule of Four explicitly for use in scar tissue remediation, and to distinguish my use of his model, will hereafter refer to it as the Four Domains of Functional Health, shortened to the Four Domains.

My understanding of the Four Domains evolved over time. Everyone using this model eventually makes it their own, by building their own web of intuitive associations drawn from clinical experience. The Four Domains played a central role in the

development of my own instructional curriculum for manual therapists, outside of my duties as a teacher at SMSC. I learned to use it effectively during all client and student assessments, as well as including it as a key part of every curriculum while teaching anatomy, craniosacral work, bodywork, and Sexological Bodywork internationally, as well as in my private practice as a holistic lifestyle consultant and Sexological Bodyworker in Los Angeles. After this deep and prolonged immersion, the use of the Four Domains seemed an obvious choice for understanding the relationship of sexual pain to the scar tissue-related problems described by this dissertation.

I observed that use of the Four Domains saved time and money otherwise spent searching among a panoply of holistic modalities for the foundational cause of each client's pain. Use of the Four Domains model also included instruction and application of a variety of self-help homework programs. In my own practice, I noticed that when clients comply with self-help suggestions, they saved significant time and energy in their healing process. Teaching self-help to research participants became a critical part of our protocol for scar tissue treatment.

The Four Domains is referenced throughout this dissertation. Radiant health is the goal for those who use this model. When radiant health is elusive, four (and only four) specific domains are examined as key obstacles to health, which the practitioner must then accurately identify within each of the body's systems. To use this model, one or more domains are identified, housing the client's predominant obstacles, which then must be isolated and treated, using manual, dietary, supplemental, or emotional release protocols. All four domains are recognized and treated in hierarchical order according to the relevance and needs of each individual, until noticeable improvement is attained. The

accurate assessment of these improvements requires time, experience, and skilled palpation to master. Efficacy of treatment is measured by observation of the results of each therapeutic intervention.

The Four Domains include biochemical, biomechanical, and emotional domains, as well as the domain of unresolved scar tissue. The biochemical domain includes that which directly affects blood chemistry, as well as the chemistry, viscosity, and granulation of the connective tissue matrix between the cells. Obstacles to healthy biochemistry include the accumulation of byproducts of foods eaten, drugs taken, choices in household and body cleaning products, as well as exposure to environment pollutants, including electromagnetic frequency pollution.

The biomechanical domain encompasses whole-body ergonomics, personal flexibility, each individual's genetically determined connective tissue density, and postural habits. Everyone exhibits variations among these elements, which influence each person's health to varying degrees. Determining which of these variables is at cause for pain or other dysfunction is necessary to untangle many kinds of pain issues.

The emotional domain refers to how much emotional tension has been sublimated within muscles and connective tissue matrixes within the body. This tension is palpable and can be tested at a number of sites where concentrated emotional charge is held. When the location of emotional holding is found, there are a number of strategies available to the trained bodyworker to elicit appropriate release until significant change in postural or muscular tension is made.

The domain of scar tissue refers to physical scars from physical traumas endured by the body. When scars are not successfully resolved, they become active as self-

replicating sources of physical blockage within and between organs, muscles, glands, and vessels, inhibiting nutrient delivery and drainage away from all body tissues. Scar tissue may resolve successfully, meaning that it no longer interrupts normal physiologic function and the free flow of *qi*.

Once resolved, scar tissue is no longer a pathologically self-replicating entity. The difference between scars that resolve and those that do not is described in greater detail in the Definitions section of this chapter. According to Medici's model, the Four Domains are essential, meaning that they can be reduced no further. Dysfunction within, and imbalance between, the domains has the potential to negatively affect every other domain, and will eventually lead to whole-system collapse if left unattended.

As the reader will soon see, it is common for scar tissue to be missed as a cause of pain and dysfunction. The Four Domains is used as an organizational principle throughout this dissertation to ensure that the relevant implications of scar formation and attendant physiologic dysfunctions are thoroughly examined. This model serves to keep scar tissue sharply in focus as the problem it in fact represents across each of the body's physiologic systems.

Use of the Four Domains helps to maintain focus on scar tissue as one possible cause for the many women who suffer unresolved sexual pain, especially after childbirth. In conventional allopathic medicine, when scar tissue is accurately isolated for its role as a cause of pain, the typical approach to its remediation is surgical removal. This only serves to create more of the very problem these surgeries seek to resolve. There are other options. The purpose of this research was to develop and document effective alternatives to conventional scar tissue treatment.

Background of the Study

In conventional medicine, scar tissue formation is ubiquitously recognized as a necessary part of wound healing (Eming, Krieg, & Davidson, 2007; Hardy, 1989; Martin & Leibovich, 2005). Both scar tissue and pelvic adhesions are regarded as natural consequences of the surgical interventions and injuries that frequently accompany childbirth. While the body-wide scope of effects from birth-acquired scar tissue remains to be fully documented, there is abundant evidence that pelvic floor injury, C-section delivery, and episiotomies are causes of abdominal or pelvic trauma for a majority of women after childbirth, all of which naturally result in the formation of scar tissue (Carroli & Mignini, 2009; Cioffi, Swain, & Arundell, 2010; Dietz & Wilson, 2005). Although medical science classifies certain adhesions as congenital, research supports that most pelvic and abdominal adhesions result from injuries and surgeries such as those mentioned above (Arung, Meurisse, & Detry, 2011; Liakakos, Thomakos, Fine, Dervenis, & Young, 2001).

The actual scope of the problem of sexual pain from adhesions and birth-related scar tissue in the pelvic floor and genital tissues has yet to be fully and clearly described. While it should be obvious that a majority of women emerge from childbirth with injuries and/or surgeries of some kind, a paucity of research connecting painful sex to birth injuries and birth-related surgical interventions reveals little data that definitively determines whether, when, or how scar tissue resulting from these birth outcomes contributes to sexual pain.

Much research into the question of sexual pain after childbirth confines its inquiry to short-term sexual pain. In one example, Signorello and her group found that up to 80%

of women with lacerations through the front half of their perineum had increased incidence of dyspareunia (painful penetration) at 3 months postpartum (Signorello, Harlow, Chekos, & Repke, 2001). What remains to be studied is how surgical repair of these injuries, and the scar tissue created by attempts at such repair, contribute to painful sex over the long term.

According to physical therapists and obstetrical researchers who write about painful sex, research from both these specialties has been limited (Rosenbaum, 2005; 2007; Signorello et al., 2001; Wurn, Wurn, & King, 2009). One reason given is that, until very recently, scar tissue has been impossible to accurately visualize without additional surgery (Rodríguez & del Río, 2013). Research across many health disciplines agrees that long-term scar-related and sexual pain from obstetric procedures remains a largely unacknowledged problem within the medical community as a whole (Achtari & Dwyer, 2005; Lower et al., 2004; Rodríguez & del Río, 2013; Steege & Zolnoun, 2009). Conversely, there is a significant body of research, which reports the physiological, medical, and economic impacts of abdominal pain, scar tissue, and adhesions from surgical procedures outside the context of obstetrics (DeWilde & Trew, 2007; Diamond & Freeman, 2001; Ellis et al., 1999; Lower et al., 2004; Lower, Hawthorn, O'Brien, Buchan, & Crowe, 2000).

In their important contributions to the literature about sexual pain, both Signorello and her group, and Rosenbaum note certain limitations in both the quality and quantity of references describing how birth-related scars affect ongoing quality of life for women (Rosenbaum, 2005, 2007; Signorello et al., 2001). However, abundant evidence relates abdominal pain and pelvic dysfunction to the presence of adhesions and scar tissue

acquired in non-obstetric contexts. One is therefore left with little choice but to infer the actual scope of the problem of sexual pain created by birth-related scar tissue from such research.

Even though there is considerable high-caliber research on non-obstetric outcomes of abdominal surgery, until recently, tracking the long-term scope of scar-related pain has proven to be difficult. The most influential studies to date about scars and adhesions posit that, since there has been no universally effective way to avoid pain and other problems stemming from surgical adhesions and scar tissue, that epidemiological studies about these postsurgical problems are rare (Ellis et al., 1999; Lower et al., 2004; Lower et al., 2000). Review studies of the literature on abdominal adhesions have stated, "[a]dhesions are the most frequent complication of abdominal surgery and may represent one of the greatest unresolved medical problems in medicine today" (DeWilde & Trew, 2007, p. 161).

Medical records are not useful sources about the sequelae of adhesions and scar tissue, painful or otherwise, because they cannot accurately reflect the long-term effects of scars and adhesions, according to one Swedish study (Tingstedt, Isaksson, & Andersson, 2007). Pain can present from surgically induced adhesions long after the surgery that caused those adhesions, and the patient may never make the connection between that long-ago surgery and her present pain. Tingstedt, et al. note that this significantly skews the data about the true impact and consequences of scars and adhesions (2007).

Research also submits that hospital methods used to record or reference postsurgical problems related to scars are problematic because of inconsistencies in

medical coding (Tingstedt et al., 2007). According to Tingstedt and other sources, problems with coding the classifications of scar-related complications contribute to confusion about accurate etiology. Tracking the real medical and personal costs of surgical scars, including the pain from adhesions that may follow is not effectively recorded by medical records (Hammoud, Gago, & Diamond, 2004; Tingstedt et al., 2007). Literature tracking pain and other complications from postsurgical scar tissue will be reviewed in Chapter 2.

Statement of the Problem

Scar tissue is largely unrecognized as a causative factor in the gynecological, urological, physical therapy, and psychotherapeutic settings where women traditionally seek help for painful sex. Conventional medicine, including physical and psychotherapies, seems largely ineffectual in relieving sexual pain from childbirth. Despite growing availability of specialized pelvic physical therapy to address physiologic aspects of scar tissue, many women are reticent to freely discuss their sex life with physical therapists. Women frequently lack specific vocabulary or self-permission to describe vaginal and vulvar pain(s) related to their physical birth injuries, while unresolved trauma, as psycho-emotional aspects of sexual pain, continues unaddressed.

Talking about these problems in therapy will not provide a physical solution for scar tissue. Women are told nothing wrong can be found; their pain is mysterious. Thus, many women who actively seek care for painful sex after childbirth are left with the impression that their pain is a product of their imagination. Because of this distinct lack of visibility, acknowledgement, and effective treatment for scar-related sexual pain in conventional care, this dissertation investigates holistic treatment for birth-related scars.

We developed alternative paradigms that address scars for this large and underserved population, using action research and intuitive inquiry as methods.

Purpose of the Study

One purpose of this study was to introduce the notion that scars have an important place in the discussion of sexual pain after childbirth. Another is to describe new approaches to treatment that investigate, assess, and address birth-related scars as one of four essential domains of health. This is a critical investigation of scar tissue and its treatment, using mixed qualitative methodologies, including action research and intuitive inquiry. This research seeks to identify the effects of scars in relation to sexual pain, by excluding other confounding factors, using the model of the Four Domains of health as a tool for assessment. Once pain from biochemical, biomechanical, and emotional causes is ruled out, according to this model, scars must be at cause.

To pursue this investigation, we worked with a convenience sample of 12 women from our local community, each of whom complained of painful sex after giving birth. In order to determine the extent of pain within each domain of health, an in-depth interview and physical examination was carried out with each research subject. We developed our assessment model from the intake process already in use in my private practice, expanding it in order to include additional variables contributing to sexual pain. Within the domain of biochemistry, we queried each subject about diet and lifestyle for the contribution of these elements to inflammation. This included questions about exposure to toxins and pollutants from work and home environments. In the domain of biomechanics, we observed and examined postural habits, taking a thorough history of

physical injuries. We noted reports of any postural changes, body image changes, and non-sexual pain that developed after pregnancy and childbirth.

We took an explicit history of each subject's emotional life, asking about parental relationships and sexual relationships, including relational changes since childbirth, sex education (and lack thereof), sexual history, and a detailed history of each subject's story of giving birth. We used a series of mapping processes for the physical examination of our subjects. First, we used muscular mapping as a method to determine where each subject held unresolved emotional tension. This informed our expectations about the likelihood of somatic recall, a spontaneous upwelling of memories associated with the body-part being palpated. In my experience, women who demonstrate significant numbness during this kind of palpation are less likely to experience episodes of spontaneous somatic recall. We found that the information gleaned from our intake process helped to eliminate confounding variables other than scar tissue as the predominant cause for sexual pain.

After a thorough intake interview and physical examination lasting 3 hours or more, informational genital mapping, scar tissue mapping, and manual scar remediation were undertaken. Mapping was an intrinsic part of action research, which was one of our two chosen research methodologies. In the spirit of action research, we undertook genital mapping as a vehicle to provide information about normal sexual physiology and arousal, encouraging input and participation from each research subject.

Thorough physical examination helped to identify scar tissue from sources other than childbirth. Since many women lack an explicit vocabulary to describe the details of their genital tissues and the specifics of scar location, we sought to establish a common

language to obtain information about birth-related sexual pain and scars. Development of this common language allowed us to maintain the peer-educator role we preferred, rather than creating a more conventional patient/practitioner distance from our research subjects.

Once the somatic sex educational mapping process was complete, mapping and manual work on the birth-related abdominal, pelvic floor, and intravaginal scar tissue took place. During this process, we were alert to episodes of somatic recall. This was characterized by the spontaneous emergence of memories that had not been a part of the subject's original birth stories prior to hands-on work. Past experience showed me that it was during such episodes of somatic recall that spontaneous, immediate, and dramatic tissue change might take place. It was as if the body had finally been given a voice to express its trauma or distress, and importantly, had taken this opportunity to let go of it.

During this process we continued to use action research as a participatory research methodology. Use of action research provided us with the ongoing opportunity for development of our hands-on protocol and allowed us to make any necessary revisions and pursue somatic sexual education. This included education about scar tissue, its treatment, and its management. We taught research subjects how to use castor oil for self-help at home. We noted subjects' enthusiasm as they regained connection, each with her own pelvic floor and sexuality using suggested somatic practices of self-help scar treatment and pelvic floor massage. Several of our subjects noted the intake and assessment process, in itself, was therapeutic, as it placed their awareness on scar tissue as an outcome of their birth process and demystified their pain.

Due to the highly personal nature of this work, we confined it to as casual and non-hierarchical an atmosphere as possible. We regarded and represented ourselves as peer-educators rather than professional experts. Our interview questions and the interpretation of them using the Four Domains as served as instrumentation for this critical investigation, rather than the use of less rigorously inclusive conventional research instruments.

Hypothesis and Research Question

We noticed several distinct episodes of somatic recall, with what appeared to be resultant dramatic and spontaneous tissue change for Kinzbach, my research partner, during exploratory scar tissue remediation work prior to this investigation. At first, we were surprised, and after several additional episodes, became quite intrigued by these occurrences. We determined to explore more about what was going on. Our hypothesis was that: Mindful palpation of scar tissue has the potential to cause immediate and dramatic tissue change.

Kinzbach had experienced several episodes of immediate and dramatic tissue change during our initial series of pelvic floor scar tissue remediation sessions. During episodes of somatic recall, her scar tissue seemed to dissolve on the spot, which I found completely novel, with a mysterious physiology. The changes in her pelvic floor were so dramatic and compelling we determined to find out whether her experiences were repeatable by others, and thus began this critical investigation. Kinzbach's story is told in detail in Chapter 3 of this dissertation.

Much of this dissertation is devoted to answering the research question: How might scars and sexual pain resolve as a result of somatic recall? This is mysterious and

unusual territory for somatic, physiological, and psychological research. There is a certain amount of literature pointing to possible explanations of the mechanics of the dramatic changes we noticed first in Kinzbach, and later in four of our research subjects.

Importance of the Study

This critical investigation fills in a substantial gap in the extant studies of women's sexual pain. This is accomplished by use of the Four Domains of holistic assessment and our premise that scar tissue is one of four primary reasons why so many women experience long-term sexual pain after giving birth. Some of the reasons why scar tissue has been a blind spot in conventional care are covered in detail in Chapter 2.

It was our intention to highlight lack of effective care for birth-related scar tissue by focusing closely on the stories of women who suffered unresolved sexual pain after childbirth. The lack of study addressing long-term sexual pain related to childbirth has been described elsewhere in this chapter, and it bears repeating here that many experts in women's health care and physical therapy decry the paucity of quality longitudinal research on this important health issue. None of the women in our study had been aware that scar tissue was a factor in her sexual pain. Our research project highlighted scars as the focus of both assessment and treatment, and research subjects sought relief resulting from the application of our scar tissue remediation, education, and management protocols.

There are many groups of health-care providers who will benefit from deepening their understanding of women's sexual pain related to scar tissue after childbirth, as well as the bio-dynamics of scar tissue itself. These groups include those who provide both holistic and conventional allopathic care for women who have given birth. Among

medical specializations, gynecologists, urologists, obstetricians, and orthopedists will gain traction in the resolution of mysterious pelvic pain syndromes, when the effects of birth-related scar tissue are included in the mix of variables considered as potential causation for sexual pain. Among adjunct conventional care providers, physical therapists will benefit directly from the Four Domains model presented in this dissertation, which features scar tissue as an essential element to consider for all pain presentations.

Among holistic care providers, chiropractors, osteopaths, and acupuncturists will have a fresh perspective to consider while assessing clients' sexual pain. When scar tissue is given full consideration for its potential to contribute to pelvic or sexual pain, it sheds important light on what is working and what may not be working correctly in normal female sexual function. Scar tissue can deeply inhibit normal sexual physiology by producing blockage of fluid delivery, nerve flow, and lymphatic drainage. For an in-depth description of how scars affect female sexual physiology, see Chapter 2.

Other professions that will benefit from this research are traditional birth care providers, including midwives and doulas, and more recently, Sexological Bodyworkers. A more complete understanding of the relationship between birth practices and scar tissue, including suturing materials, suturing techniques, and the value of perineal closure during C-section are examined. Many other aspects of common labor and delivery practices have important implications for the formation of scar tissue in the maternal abdomen and pelvis. Literature that examines the effects of these common labor room practices is examined in depth in this dissertation. By providing a focus on scar tissue formation, new choices may be supported in these common labor room practices that will provide better birth outcomes and long-term sexual function for mothers.

Sexological Bodyworkers will benefit from the model of care we present in this dissertation. Our model of care utilizes many aspects of Sexological Bodywork and is within the scope of practice for this new profession. As more women become aware of Sexological Bodywork as an alternative source of care and relief for sexual pain after childbirth, this dissertation will provide practitioners a guide for the development of their own effective care protocols. Additionally, there is the opportunity for peer-based provision of care for scar tissue. Although both the researchers are Sexological Bodyworkers, our peer-based model of care could be utilized by anyone with scope of practice to work directly with genital scar tissue.

Lastly, and most important, the women who receive work from those who use the protocols outlined in this dissertation will benefit from this research. The need for this work is great, as the review of literature will support. Serving the needs of this large group of women, who have not found sufficient relief working in more conventional arenas, motivated this critical investigation.

Limitations of the Study

This research was an initial critical investigation of first one, and then several women's novel and compelling spontaneous resolutions of birth-related scar tissue. As such it was limited in its scope, instrumentation, and research methodologies. This was a small-scale investigation, with a limited sample size of research subjects. We went deeply into each subject's medical, psychological, sexual, and birth histories. We felt we needed sufficient time with each woman to understand, isolate, and treat her scar tissue, apart from other variables that might contribute to her pain presentation.

We used non-typical instrumentation. We were searching for a holistic approach and understanding of the problem of sexual pain as it related to birth-acquired scar tissue. We found that the unconventional use of the Four Domains model, as both assessment tool and instrumentation, provided us with sufficient data to determine the veracity of our hypothesis and answer our research question.

Ours was a holistic and inclusive approach to solving the questions we set out to answer, rather than a more typical reductionist and positivist model of research. Our choice of research model and methodologies provided a thoroughgoing holistic approach that allowed us to consider the cause-and-effect relationship between birth outcome, contributions made by each subject's emotional body, and scar tissue in the resolution of her sexual pain.

When documenting hands-on work, the subjective nature of each person's experience is notoriously difficult to describe and to quantify. The impetus for our inquiry originated in Kinzbach's embodied experience. The critical investigation that followed was somatic, and integrated the veracity of signals emerging spontaneously from subjects' bodies with the subjective experiences of each of the 12 women who were our research subjects. In order to remain faithful to the felt truth of each woman's experience, we limited our approach, by excluding both reductionist and positivist tools of assessment, instrumentation, and analysis. While some trans men are able to and do bear children, none participated in this study. Our participants were limited to cis-gendered women who identified as such. The use of the pronouns "she" and "her" throughout this document reflects this circumstance. Capturing the authentic voice of our subjects' bodies was our goal.

Definitions

Autonomic Nervous System

The autonomic nervous system (ANS) is the part of the nervous system once called "vegetative," meaning it operates outside of conscious control. The ANS regulates homeostasis, keeping the body's neuroendocrine system in balance by responding to survival needs and regulating the body's finite resources (Berntson & Cacioppo, 2000). These include blood delivery into capillary beds, glandular output and restoration, digestion and absorption of nutrients into the bloodstream, and the storage, conversion, and metabolization of glucose (Berntson & Cacioppo, 2000; Guyton & Hall, 2000; Scanlon & Sanders, 1997).

The autonomic nervous system (ANS) breaks down into two parts: the sympathetic and parasympathetic branches. When the organism is under normal levels of stress, these branches pendulate automatically, between complementary states of expression at regular 90–120-minute intervals, during each circadian period of 24 hours (Rossi & Nimmons, 1991; Scaer, 2012). The sympathetic, or up-regulating branch of the ANS, attunes the body's physiology to cope with stress, preparing it for any potential need to fight or flee. The parasympathetic branch of the ANS returns the body's physiology to homeostasis through a process of down-regulation, and allows glands, blood delivery and organs to recover from stress once the perception of danger has reduced sufficiently (Scaer, 2012). Organ and glandular repair take place during periods of relaxation and recalibration, in order to accomplish full restoration. This recalibration

period is required to compensate for the output demanded by survival-related stress or the perception of such stress (Levine, 2010; Scaer, 2012; Selye, 1978).

Current trauma theory defines extreme expression of the parasympathetic branch of the ANS as the freeze or collapse response (Levine, 2010; Scaer, 2005; van der Kolk, 2014). For many mammals, this extreme response to threat may prevent predation by the prey appearing to be dead (Porges, 2013; Scaer, 2012). In extreme cases, this end-of-spectrum freeze state prepares that animal for death by the release of pain-modulating neurochemistry, when no possible escape can be found (Lanius, Paulsen, & Corrigan, 2014).

Smooth muscle in fascia: Smooth muscle is a specialized type of muscle tissue mediated by the autonomic nervous system, and as such is outside of conscious control (Guyton & Hall, 2000). Smooth muscle forms the walls of the vessels and hollow organs that contain and move materials through the body, such as blood (arteries and veins), food (intestines), and infants passing out of the uterus (Juhan, 1995). The autonomic nervous system governs smooth muscle tone, and it is suggested that autonomic cues also govern the tone of smooth muscle cells found in fascia (Schleip, 2003a; Staubesand & Li, 1996).

In 1996, Staubesand and Li published important new histological research, which described their discovery of smooth muscle cells embedded in the matrix of lumbar fascia, along with “a rich intrafascial supply of capillaries, autonomic nerves and sensory nerve endings” (Schleip, 2003c, p. 107). The importance of this research was that it linked the up-regulating and down-regulating effects of the autonomic nervous system to the structure and function of fascia itself. The finding that fascia is permeated with

smooth muscles cells suggests that fascia has potential contractile properties and responds to autonomic cues (Schleip, Klingler, & Lehmann-Horn, 2004).

Osteopaths, bodyworkers, craniosacral therapists, and histologists have pursued the suggestion of a link between sympathetic activation and increased fascial tone with enthusiasm (Bialosky, Bishop, Price, Robinson, & George, 2009; Chaitow, 2013; McPartland & Skinner, 2005; Schleip et al., 2004). In recent work, Schleip and his colleagues found that the smooth muscle cells in fascia could not be induced to contract in vitro when exposed to stress hormones (Schleip, 2016a). However, Schleip notes that a link has been reported between activation of sympathetic nerve fibers within fascia, and the expression of cytokines associated with tissue stiffening. He submits that further research will be required to determine the mechanisms governing any potential relationship between sympathetic up-regulation and tissue stiffening in humans (Bhowmick et al., 2009; Schleip, 2016a).

Smooth muscle, fascia, and autonomic response: Given the implication of Staubesand and Li's research, it is not surprising that autonomic factors appear to play a strong role in the resolution of scar tissue. By stimulating mechanoreceptors in fascia that are pressure sensitive, paradoxical relaxation may be initiated (Schleip, 2003c; Tozzi, 2015a). According to Tozzi, certain bodywork techniques stimulate these mechanoreceptors, providing an autonomically driven down-regulation response (Tozzi, 2015a). Tozzi cites the work of Robert Schleip, a connective tissue researcher and Structural Integrator, who postulates that this can change local tissue viscosity, thereby allowing stiffened tissue to soften. Shleip suggests that as these mechanoreceptors are stimulated, the autonomic nervous system (ANS) spontaneously pendulates (Schleip,

2003b). He explains that the ANS changes between up-regulation and down-regulation. Up-regulation is a sympathetically dominated state that tends toward vigilance, while down-regulation is a parasympathetically dominated state, which allows the whole body to shift toward relaxation.

Here is a typical example from Sexological Bodywork, an educational modality with a focus on somatic sexuality. Many parasympathetic nerves exit the sacrum and are located in, around, and between the internal and external anal sphincters. During the direct parasympathetic stimulation available during gentle forms of anal massage, a dramatic swing from sympathetic to parasympathetic autonomic dominance can down-regulate the nervous system of the recipient to the point of drooling (Kramer, 2003). This even occurs when there has been anxiety or trepidation about the novelty of receiving anal massage (Kramer, 2003, 2009).

According to Schleip, Tozzi, and others, as the client relaxes and local vasodilation increases, blood returns to ischemic tissues, and chronic muscular tension is reduced (Cantu & Grodin, 1992; Schleip, 2003b; Tozzi, 2012, 2015a). The therapist can sense these changes in her hands, and follow changes in tissue tone. This allows the therapist to more easily distinguish the difference between the unchanging tension of stiff and scarred cross-linked adhesions in the connective tissue, and the melting of chronic myofascial holding patterns. Simultaneously, emotional and postural stress patterns let go during this relaxation process (Kramer, 2003).

Connective Tissue

Connective tissue is a broad anatomical category, which includes bone, cartilage, periosteum (a fibrous skin around the bone), ligaments, tendons, fascia, blood, and lymph

(Schultz & Feitis, 1996). Each of these tissues has a common origin in the mesodermal layer of the developing embryo (1996). All connective tissue has a common structure, which includes cells and sometimes fibers suspended within a surrounding matrix (Scanlon & Sanders, 1997). The matrix of bone is mineralized, while the matrix of blood is liquid. Three types of connective tissue are relevant to this discussion of pelvic floor scar tissue. These are fascia; the loose, areolar (cushioning) connective tissue that fills the spaces between other more well-defined body structures; and the extracellular matrix (ECM). The ECM is a loose tissue that has a texture like raw egg white yet contains a cytoskeletal continuum that connects all body structures together at a minute level.

Fascia. In conventional medical science, the conceptual function of fascia has been limited to one of structural support. Fascia connects one organ to another, one bundle of muscle fibers to another, etc. In the dissection lab, fascia has been characterized as the tissue that surrounds and obscures "more interesting" glands, vessels, nerves, and organs (Hedley, 2010; Myers, 2014a, 2014b; Schleip, Jäger, & Klingler, 2012). According to leading researchers in the field, in its loosest definition, fascia is described as a ubiquitous connective tissue that surrounds and connects everything in the body to everything else (Chaitow, 2012c; Schleip et al., 2012). Recently, fascia and other connective tissues have been redefined as novel substances that defy standard Newtonian physics, becoming the subject of bold new hypotheses about how tissue repair and healing may occur (Guimberteau & Armstrong, 2015; Ho & Knight, 1998; Ingber, 2006, 2010; Rodríguez & del Río, 2013; Tozzi, 2015a).

What exactly is fascia? This is a difficult question, as standard sources of anatomical description, including medical textbooks, have not agreed on an inclusive

definition for this ubiquitous and pervasive tissue that touches every cell in one's body. This has led to debate and confusion across the many disciplines that research and write about fascia. English-speaking countries tend to adhere to recent editions of Gray's Anatomy, which describe fascia as "masses of connective tissue large enough to be visible to the unaided eye" (Standring, 2015, p. 41).

Historically, the International Anatomical Nomenclature Committee divided fascia into two groups: superficial fascia, and deep fascia (Schleip et al., 2012), while the Federative International Committee on Anatomical Terminology (FICANC) defined fascia as " 'sheaths, sheets or other dissectible connective tissue aggregations'. This includes 'investments of viscera and dissectible structures related to them'" (p. 497). This definition describes fibrous connective tissues, but omits ubiquitous, softer, and more gelatinous tissues, and, importantly for the study of scar tissue, ignores the extracellular matrix (ECM) surrounding every living cell. This leaves the critically important ECM in a kind of no-man's land of general, unspecified connective tissue.

In an effort to find a more inclusive definition for fascia, the presenters at the first meetings of the International Fascia Congress developed a broader definition: "the 'soft tissue component of the connective tissue system that permeates the human body'. One could also describe them as fibrous collagenous tissues that are part of a body-wide tensional force transmission system" (Schleip et al., 2012, p. 499).

For the purposes of this dissertation, I will use Thomas Findley's inclusive definition of fascia as: "the soft-tissue component of the connective tissue system that permeates the human body, forming a continuous, whole-body, three-dimensional matrix of structural support" (Findley & Schleip, 2007, p. 1). This definition encompasses both

loose areolar connective tissue, including the extracellular matrix, as well as the more commonly accepted definition of fascia as fibrous sheets that contain, surround, separate, and interpenetrate muscular tissue, glands, and organs (Findley, 2009; Tozzi, 2012).

Collagen

Fascia is made up of fibers and immune system cells, held together and suspended in a surrounding extracellular matrix. Collagen is one kind of fiber found in fascia, made from protein, and forms an important structural component of fascia. Collagen is classified into types, and according to Diegelmann and Evans, as of 2004, at least 23 distinct types of collagen fibers had been identified. However, Lodish, Berk, and Zipursky suggest that 80 to 90% of the collagen in the body is classified as types I, II, or III (Diegelmann & Evans, 2004; Lodish, 2000). Collagen fibers have been shown to over-proliferate in response to inflammatory biochemical cues, as part of the wound repair process (Eming et al., 2007; Hardy, 1989; Henderson & Sheppard, 2013; Spitalnik, 2007).

The extracellular matrix (ECM): According to anatomists Heine and Pischinger, blood and nerves cannot communicate directly with any cell. Electrical and chemical information must be mediated by and communicated through the extracellular matrix (ECM), which is a gelatinous, gooey mass of ground substance surrounding and separating each cell (Pischinger, 2007; Pischinger & Heine, 1991). The ECM has a deep role to play in the events that create and shape scar tissue, the mechanisms determining how it spreads, and most importantly, how it may be remediated.

While conventional medicine and anatomy books typically define connective tissue as non-living, biophysical and anatomical researchers define the ECM as a

dynamic living matrix, which unifies the whole body and mediates cellular behavior (Ho, 1997; Langevin, 2006; Oschman, 2005; Pischinger & Heine, 1991; Scanlon & Sanders, 1997). The ECM surrounding each cell is indeed active; many fascia researchers characterize fascia and the ECM as an informational broadcast delivery system through which electrical and chemical information must be transmitted, to orchestrate all cellular behavior and function (Hedley, 2007; Juhan, 1995; Oschman, 2005; Pischinger, 2007; Tozzi, 2012).

The healthy ECM "is a dynamic and vibrant and alive component of the organism with vital roles in the moment-by-moment operations of virtually all physiological processes" (Oschman, 2009, p. 218). In the mid-20th century, Austrian anatomist and connective tissue researcher Alfred Pischinger described the ECM as a self-regulating entity that determines the overall health of the body. Pischinger also defined this living matrix as an "organ of perception" (Pischinger, 2007, p. 99). Scars start their formation within the ECM, and when adhesive scar tissue forms, it then interferes with the vital communication function within this organ of perception and communication.

DNA and Connective Tissue

Connective tissue researchers agree that there is more to the ECM than goo. Scientists have identified the ECM as containing many kinds of protein fibers. These include multiple types of collagen, as well as elastin, which gives connective tissue its ability to stretch and regain its resiliency. Connective tissue also contains a broad variety of immune system cells, and a minute, tubular cytoskeletal structure of support that communicates right into the deep innards of every cell (Ingber, 2010; Myers, 2001, 2014a; Pischinger & Heine, 1991). Importantly, this microscopic cytoskeleton

communicates changes in pressure and other mechanical stresses onto and passing through the ECM--from the outside environment straight to the cell's nucleus.

This structural, cytoskeletal connection from the ECM into the cell's nucleus is of particular interest. Recent research finds that messages transmitted through this delicate cytoskeletal framework, mitigated by pressure and other tensional changes in the ECM, have a direct impact on DNA expression (Ingber, 1993, 2010; Myers, 2014a; Pischinger & Heine, 1991). "Every cell is intimately linked to its extracellular space [ECM]. The extracellular space alone enables metabolic processes to reach the cell, and *only as a result of such conditions can the genetic material in the cell nucleus become active* [emphasis added]" (Pischinger & Heine, 1991, p. 311).

Minute microtubules distributed throughout the intracellular connective tissue matrix seem to have the ability to store and transmit information, and "may act like computers, storing memories in the form of 'information strings'" (Tozzi, 2014, p. 261). Ingber and Oschman agree that microtubules record and store information that reflects conditions present in the connective tissue matrix at the time of the creation of each new microtubule, much like the rings of a tree reflect the environmental conditions present during its growth cycles (Ingber, 2010; Oschman & Oschman, 1995a).

Genetics

Different tissues undergo cellular breakdown at different rates. The Oschmans, and also Ingber, characterize certain tissues as having a longer microtubular memory than others. These tissues thus have more structural integrity (Ingber, 2010; Oschman & Oschman, 1995a). Both Tozzi and Ingber suggest that the healthy plasticity of the surrounding environment transmits differing information via the microtubules found

throughout the ECM, which penetrate into cell nuclei. As a result of information transmitted through the ECM, these microtubules reconfigure themselves, such that they directly affect the cell's genetic expression (Ingber, 2010; Tozzi, 2012). As the viscosity of the ECM changes due to local stiffening imposed by scar tissue, it stands to reason that scar tissue is a factor in genetic expression in cells near scar tissue. This is born out by cancer research, which finds that scar tissue and tumors (made of genetically aberrant cells) are related by having common inflammatory origins within their surrounding ECM (Ardies, 2003).

Epigenetics

Researchers across diverse backgrounds suggest that the application of manual pressure can be defined as an epigenetic mechanism (Bavan & Midwood, 2011; Myers, 2001, 2014a; Tozzi, 2015a). The action of epigenetics as it applies to this discussion is that polymers in the microtubular cytoskeleton running through ECM are literally imprinted and store this imprint as a kind of tissue memory (Ho, 1994; Lipton, 2005; Oschman & Oschman, 1995a; Tozzi, 2014). Oschman and Oschman submit that when tissues are compressed and released during massage and other kinds of bodywork, toxins, whether from biochemical or emotional sources, are liberated from the connective tissue matrix, triggering spontaneous memories (Oschman & Oschman, 1995a). According to Ingber, pressure changes in the ECM alter the signaling to the cells' DNA, switching certain strands into expression, while suppressing others (Ingber, 2010).

Tissue Memory

The Oschmans propose that DNA changes occur during reorganization of the cytoskeleton's microtubular polymers. They suggest that this can be re-experienced by

the client as provoking discrete memories, and surprisingly, experienced simultaneously by the practitioner in rare circumstances (Oschman & Oschman, 1995a):

> Connective tissue structure is therefore a record or memory of the forces imposed on the organism. This historical record has two components. The genetic part recapitulates the story of how our ancestors successfully adapted to the gravitational field of the earth. The acquired component is a record of the choices, habits, and traumas we have experienced during our individual lifetime. (para 39)

Pelvic Pain

The role of fascia as a proprioceptive organ is becoming established in the medical community. High densities of mechanoreceptors are found in in various fascial structures, especially the thoracolumbar fascia (Kopeinig, Gödl-Purrer, & Salchinger, 2015). Connective tissues demonstrate pathological changes in chronic pain patients. An Austrian paper presented at an annual scientific meeting declared "a hypothetical connection between the chronification of pain and proprioceptive deficits exists" (p. 1).

Stress is becoming recognized as a significant contributor to interoceptive (inside the body) sensitivity and chronic pain presentations (Farb & Mehling, 2016; Pollatos, Füstös, & Critchley, 2012). Researchers propose:

> A positive feedback model involving stress (in particular early life or chronic stress, as well as major adverse events), the dysregulation of physiological stress axes, altered perception of bodily sensations, and the generation of physical symptoms, which may in turn facilitate stress. (Schulz & Vögele, 2015, p. 53)

Definitions for women's sexual pain are in flux. Due to a lack of evidence-based clinical and diagnostic protocols, and confusion over redundant terminologies, names for

female sexual pain disorders came under academic and professional scrutiny in the early 2000s (Basson, 2002, 2005; Basson et al., 2000; Basson et al., 2004; Binik, 2005; Binik, Brotto, Graham, & Segraves, 2010). Before the publication of the fifth edition of the Diagnostic and Statistics Manual (DSM-5) in 2013, a reevaluation of terminology related to female sexual pain was undertaken, and a more inclusive definition for women's sexual pain was published (Perez & Binik, 2016). According to Perez and Binik, the DSM-5 eliminates many distinct terms for painful sex, including dyspareunia, vaginismus, vulvodynia, vulvar vestibulitis, and vestibulodynia. Formerly used as diagnostic classifications related to painful sexual penetration, these terms are now collapsed into the more general diagnostic category of GPPPD, or Genito-Pelvic Pain Disorder/Penetration Disorder. As many of these older diagnostic terms are still in use in conventional allopathic care, they are included in this list of definitions.

The Brigham and Women's Standard of Care for Female Chronic Pelvic Pain Syndromes states:

> Generally, female pelvic pain has been defined as pain and dysfunction in and around the pelvic outlet, specifically the suprapubic, vulvar, and anal regions. A plethora of various terms/diagnoses encompass pelvic pain as a symptom, including but not limited to: chronic pelvic pain (CPP), vulvar pain, vulvodynia, vestibulitis/vestibulodynia (localized provoked vestibulodynia or unprovoked vestibulodynia), vaginismus, dyspareunia, interstitial cystitis (IC)/painful bladder syndrome (PBS), proctalgia fugax, levator ani syndrome, pelvic floor dysfunction, coccygodynia, tension myaglia of the pelvic floor, shortened pelvic floor, and

muscular incoordination of the pelvic floor muscles. (Brigham and Women's Hospital, 2015)

Abdominal and pelvic adhesions: Abdominal and pelvic adhesions are growths of sticky, mucilaginous tissue that form between the abdominal organs themselves, and also between organs and the surface of the peritoneal (inner abdominal surface) cavity (Arung et al., 2011). These tissue growths are found in many postsurgical patients, particularly those who have undergone abdominal and gynecologic surgeries (Arung et al., 2011; Brill, Nezhat, Nezhat, & Nezhat, 1995; DeWilde & Trew, 2007). Abdominal and pelvic adhesions cause bowel obstruction and also cause abdominal, pelvic, and pelvic floor pain (Diamond & Freeman, 2001; Ellis et al., 1999; Graziottin & Giraldi, 2006; Hedley, 2010; Liakakos et al., 2001).

Adhesions refer pain by tugging on any adjacent structures and also by restricting blood delivery and nerve impulses. More importantly, adhesions have been proven to independently generate their own nerve fibers and blood vessels (Arung et al., 2011; Binnebösel et al., 2008; Sulaiman et al., 2001). They were shown to be loci capable of producing and transmitting pain independently, once they were discovered to contain endogenous nerve fibers (Sulaiman et al., 2001).

Abdominal adhesions are of serious concern in the medical community (Ellis et al., 1999; Kobesova, Morris, Lewit, & Safarova, 2007; Lower et al., 2004; Parker et al., 2005). One danger lies in the potential for interruption of blood flow that feeds the normal peristaltic progression of digested food through the intestines. Sections of intestines die when their blood supply is cut off, and have the potential to rupture, leading to septicemia and death (Attard & MacLean, 2007; Barmparas et al., 2010; Cleveland

Clinic, 2017). According to Menzies and Ellis, this can happen as soon as 1 month after abdominal surgery (Menzies & Ellis, 1990). Many researchers agree that adhesions proliferate more rapidly when systemic inflammation is already present in the patient (Arung et al., 2011; Bakkum et al., 1995; Robertson et al., 2010; Sulaiman et al., 2001).

Cystitis & interstitial cystitis: Bladder and urethral pain, urinary pain, urinary urgency, and urinary frequency are hallmarks of cystitis (Parsons et al., 2002). Bladder pain is characterized as being poorly understood, and its prevalence is reported to be under-diagnosed (Berry et al., 2011; Parsons et al., 2002). When urinary tract symptoms of pain and urgency are chronic and unrelated to any identifiable cause, i.e. no bacterial or viral infection, the condition is classified as interstitial cystitis.

Dyspareunia: Dyspareunia is defined as "recurrent or persistent genital pain associated with sexual intercourse" (Berman, 2005). Basson et al., and others note that dyspareunia is a condition recognized as having both organic and psychological origins (Basson et al., 2000; Bergeron, Binik, Khalifé, Pagidas, & Glazer, 2001; Berman, 2005). Scar tissue is rarely identified as a primary cause of dyspareunia, although it has been noted that when the scars resolve, painful penetration resolves as well (Medici, 2011a).

Dyspareunia is described as the secondary outcome of a number of distinct pelvic floor and genital pain syndromes, including but not limited to perineal trauma, vaginismus, vulvodynia, vulvar vestibulitis, lichens sclerosus, and other genital or vulvar dermatologic disorders (Bornstein et al., 2016; Goldstein & Pukall, 2009; Heim, 2001). Basson has critiqued the standard definition of dyspareunia for not including vaginal pain that resulted from failed attempts at intercourse (Basson et al., 2004).

Perineal Trauma

The definition of perineal trauma includes any injury to the labia, urethra, clitoris, vaginal walls, perineal muscles, and the anal sphincters (Priddis, Dahlen, & Schmied, 2013). Perineal trauma is a major contributor to painful sex postpartum, and a potent cause of long-term sexual pain (Albers & Borders, 2007). Perineal trauma is classified into four degrees, according to the location and depth of tears to pelvic floor tissues (Herrera, Schneiderman, & Perez, 2011).

First-degree perineal tears spread from the mucosal tissue lining the vaginal canal outward to the superficial skin layer of the perineum only. Second-degree tears affect deeper tissue layers, penetrating into the body of the perineal muscles. Third-degree tears extend more posteriorly into the perineum, intruding into the anterior anal wall through the front part of the anal sphincter. Fourth-degree tears encompass the entire length of the perineum, ranging all the way back to the posterior anal wall, into and through the ano-rectal mucosa (Herrera et al., 2011; Kudish, Sokol, & Kruger, 2008; Rådestad, Olsson, Nissen, & Rubertsson, 2008; Signorello et al., 2001).

Prolapse

Pelvic organ prolapse (POP) is a condition of the collapse of support for pelvic organs, including the uterus, bladder and rectum (Lazarou, 2016). When these organs lose their structural support, they drop through the vaginal or anal openings, and in advanced cases can be seen to protrude. Prolapse is categorized in four stages (Stages I–IV) according to severity. According to the International Urogynecological Association and the International Continence Society, stages of descent are measured by the relationship

between the organ or organs in question and the position of the hymenal ring just inside the vaginal opening.

In their joint report on terminology, the International Urogynecological Association and the International Continence Society define stages of prolapse:

> Stage I: Most distal portion of the prolapse is more than 1 cm above the level of the hymen. Stage II: Most distal portion of the prolapse is 1 cm or less proximal to or distal to the plane of the hymen. Stage III: The most distal portion of the prolapse is more than 1 cm below the plane of the hymen. Stage IV: Complete eversion [displacement] of the total length of the lower genital tract is demonstrated. (Haylen et al., 2011, pp. 10–11)

Vaginismus: Vaginismus is described as an uncontrollable, involuntary spasm of the vaginal muscles (Pacik & Cole, 2010). Basson defines vaginismus as either recurrent or persistent, occurring in the outer third of the muscles of the vaginal canal, which makes sexual penetration painful, and in some cases, impossible (Basson et al., 2000). According to Perez and Binik, an evidence-based gynecological standard for the diagnosis of vaginismus has been difficult to obtain. Research videos of pelvic examinations showed that women exhibited sufficient emotional stress, related to the prospect of examination, that actual physical diagnosis was never completed. Because consistent diagnostic indicators were difficult to obtain, this term was collapsed into the category of GPPPD in the DSM-5 (Perez & Binik, 2016). Vaginismus is considered to be multimodal in etiology, with women demonstrating “varying degrees of comorbidity between pain, fear, pelvic floor hypertonicity, and penetration difficulties” (para 6).

Vestibulitis or Vulvar Vestibulitis

Vestibulitis and vulvar vestibulitis are defined as inflammation of the vestibule of the vulva. The vestibule is tissue immediately adjacent and external to the vaginal introitus, that extends to the inner surface of the inner labial lips (Marinoff & Turner, 1992). Bergeron defines vulvar vestibulitis as a genital pain syndrome, described first by Friedrich in 1987 (Bergeron et al., 2001; Friedrich, 1987). Bergeron quotes Friedrich's diagnostic criteria for this sexual pain syndrome: "1) severe pain on vestibular touch or attempted vaginal entry, 2) tenderness to pressure localized within the vulvar vestibule, and 3) physical findings confined to vestibular erythema [redness and inflammation] of various degrees" (Bergeron et al., 2001, p. 45).

Vestibulitis, vulvar vestibulitis, vulvodynia, and vestibulodynia all have similar definitions. The goal of reclassifying many former definitions of sexual pain was to find and agree on new terminology that "acknowledges the complexity of the clinical presentation and pathophysiology involved in vulvar pain and vulvodynia, and incorporates new information derived from evidence-based studies conducted since the last terminology published in 2003" (Bornstein et al., 2016, p. 126). According to both Brotto and Basson, there is an emotional component to these pain syndromes, and in a paper on mindful sex, Brotto cites the work of Khandaker et al., stating that "women with chronic vulvar pain were 10 times more likely to have an anxiety disorder and three times more likely to have major depression or dysthymia before the onset of genital pain" (Brotto, 2013, para 14).

Vestibulodynia

One gets a sense of the potential for confusion among clinicians when reading this definition for provoked vestibulodynia:

> Provoked vestibulodynia (PVD; formerly called vulvar vestibulitis syndrome, focal vulvitis, vestibular adenitis, and focal vestibulitis vulvae) is characterized as localized provoked pain at the vaginal vestibule, whereas generalized vulvodynia (formerly termed essential or dysesthetic vulvodynia and burning vulva syndrome) is characterized by unprovoked, diffuse vulvar pain affecting the entire vulvar area. At this point, it is not known whether provoked and unprovoked vulvar pain have overlapping or distinct pathophysiologies; however, there is agreement in the literature that vulvodynia can be caused by different factors. (Pukall et al., 2016, p. 292)

Vulvodynia

Vulvodynia is a general term coined by Towell and Young in 1978, used to describe vulvar pain (Bornstein et al., 2016). Vulvodynia is considered to be idiopathic, meaning without identifiable cause. According to Pascale, when identifiable anatomical or other clinical pathology is not present, this is the diagnosis most often given (Pascale, 2014). Since the 2013 reclassification of definitions of sexual pain referred to above, vulvodynia has been shown to have multiple etiologies, and has been redefined as "a constellation of symptoms of several (sometimes overlapping) disease processes" (Bornstein et al., 2016, p. 126). In the DSM-5, the term vulvodynia has been collapsed into the general definition of GPPPD.

Scar Tissue

Recent research suggests that many connective tissue elements (collagen species, inflammatory cytokines, and other chemicals) present in the ECM directly affect immune function, and have the potential to change the outcome of normal wound healing (Arnsdorf, Tummala, Castillo, Zhang, & Jacobs, 2010; Bavan & Midwood, 2011). Current research explains that the process of connective tissue adaptation to stress affects the behavior and expression of stem cells during the inflammatory process. According to Spanish researchers Rodriguez and del Rio, stress negatively influences wound healing by stimulating the over-production of dense collagen proteins. These protein fibers stiffen the EMC, causing congestion by increasing its viscosity due to over-granulation (Rodríguez & del Río, 2013). The ECM is the ground substance from which scar tissue is generated.

Rodriguez and del Rio explain that stem cell messaging determines the density of the ECM by triggering, via genetic programming, which kind of collagen is produced. Other researchers have reported that when the overall density of the ECM exceeds a specific threshold, the over-proliferation of dense collagen fibers creates a scar, which, under inflammatory circumstances becomes a self-proliferating entity (Ingber, 2003; Kobesova & Lewit, 2000; Langevin et al., 2010).

Researchers and health commentators agree that over-production of collagen in the ECM eventually leads to a loss of function (Medici, 2015c; Pischinger, 2007; Pischinger & Heine, 1991). The consequences and limitations of this lost function manifest across a broad range of human health issues. Researchers note that scar-related interruptions of the health of the body include changes in immunity, limitations in range

of motion, the interruption of digestion, blockages in elimination processes, and painful sexual function (Alvarez, Vollmann, & von Andrian, 2008; Hardy, 1989; Karalaki, Fili, Philippou, & Koutsilieris, 2009; Kjaer, 2004; Medici, 2011a, 2016c).

Scars are generally not thought of as modulators of overall health, but anatomists and recent research alike suggest that scars are known to exert particular influence within the ECM (Pischinger, 2007; Pischinger & Heine, 1991; Serrano & Muñoz-Cánoves, 2010). Scars are defined by many sources as thickened granulations made of several kinds of protein fibers, which create compromises to the plasticity of the ECM. By adding structural strain to the microtubule network traversing through the extracellular matrix, scars create changes in the genetic output of each cell (Bavan & Midwood, 2011; Langevin et al., 2011; Rodríguez & del Río, 2013; Serrano & Muñoz-Cánoves, 2010). Anatomists Alfred Pischinger and Hartmut Heine have emphasized that over time, compression within the ECM affects the overall health of tissues local to the scar, and according to Medici, this has the potential to promote disease states (Medici, 2016c; Pischinger, 2007; Pischinger & Heine, 1991).

Connective tissue research confirms that scars inhibit communication between cells, and can alter the DNA messaging that determines cellular function and behavior (Ingber, 2010; Serrano & Muñoz-Cánoves, 2010). A scar's effect on the ECM changes both genetic and epigenetic information affecting cellular behavior, and many researchers agree that this process causes dysfunctional imprinting and behavior to occur in the fibers and ground substance that make up the ECM (Ingber, 2010; Pischinger, 2007; Rodríguez & del Río, 2013). This promotes a dysfunctional wheel of cause and effect, and produces scars that become self-propagating entities (Kobesova et al., 2007). Scientists describe

how immune cells over-produce endogenous collagen fibers. During collagen infiltration of the ECM, ongoing inappropriate fiber deposition propagates a progressive stiffening and loss of elasticity, which triggers immune cells in the ECM to over-produce more collagen, etc. (Mann et al., 2011; Serrano & Muñoz-Cánoves, 2010; Spitalnik, 2007).

Somatic pioneer Thomas Hanna, as well as others suggests that accurate proprioception is a use-it-or-lose-it proposition (Hanna, 1990; Loupos, 2011). When, due to inflammatory factors, tissue stiffening due to self-propagating scar tissue occurs, the function of local tissues is affected by the thickening ECM. At this point, blood flow, neural messaging, sensory integration, and eventually one's very proprioceptive literacy become diminished (Hanna, 2004; Loupos, 2011; Medici, 2016c).

Scar tissue changes one's proprioceptive sensitivity over time. For example, in both Hanna's and Hulme's models of proprioception, it is suggested that if one cannot feel what is happening in the muscles and connective tissues of the pelvic floor, the mental representation of these muscles, encoded within the sensory motor cortex of the brain, "go dark" (Association for Hanna Somatics Education, 2017; Hulme, 2005). A feedback loop develops that promotes desensitization. As this happens, physical structures within the body, corresponding to the now-dark mental representation of these body parts, receive less information. Consequently, one's physical sense of balance and potential genital sensitivity, will diminish (Hanna, 1990; Hulme, 2005; Loupos, 2011; Medici, 2011a).

Many pelvic pain experts explain that, over time, progressive dissociation due to subtle nerve compression (whether due to scars or chronic muscular tension) has a dampening effect on the healthy propagation of neural impulses (Asplund, Barkdull, &

Weiss, 2007; Prendergast & Weiss, 2003; Weiss, 2001; Wise & Anderson, 2010). Furthermore, if the scar continues to self-propagate as an adhesion, it can actually initiate the generation of pain, because adhesions generate their own nerve supply. Adhesions are common after both gynecologic and abdominal surgery.

In genital scar tissue, pleasurable sensitivity can attenuate only to be replaced by pain. As pleasurable sensations are lost, the very nerves that once propagated pleasurable impulses become compressed by a thickening ECM. These nerves then begin to propagate pain impulses, to which the spinal cord can become habituated. To resolve spinal cord pain habituation, it takes considerable time, mindfulness, and ongoing practice (Basson, 2012; Brotto, 2013; Parks, 2010; Weiss & Prendergast, 2006; Wise & Anderson, 2010).

According to professor of physical therapy, Janet Hulme, tissue stiffening will eventually affect motor control. Hulme states that scar accumulation occurs as an unfortunate side effect of aging, compromising the overall tone and responsive contracture of pelvic floor muscle fibers as the body's weight is redistributed while moving, from sitting to standing to walking. In addition to diminishing sexual response, muscle atrophy and its replacement by scar tissue contributes to pelvic organ prolapse, urinary, and fecal incontinence (Hulme, 2005). This atrophy can also lead to bony injury, such as a broken hip, resulting from loss of balance, or deformation of the ischial spine at the back of the pelvis, leading to compression of the pudendal nerve (Antolak, Hough, Pawlina, & Spinner, 2002; Marshall, Schabrun, & Knox, 2017; Schabrun, Jones, Kloster, & Hodges, 2013; Tozzi, 2012). Pudendal nerve entrapment is another common cause of sexual and genital pain (Weiss & Prendergast, 2006).

If scar tissue, including its effect on fascia and the ECM, is this dynamic, why has its influence on health been roundly ignored in conventional allopathic circles? According to connective tissue experts and educators, the answer to this question is threefold. First, until recently, most connective tissues (and the scar tissue they contain) have been difficult to visualize outside of direct dissection. Medical imaging equipment has been focused on other tissue targets, such as the organs, glands, blood vessels, bones, and teeth (Myers, 2014a; Schleip et al., 2012). Secondly, since the Renaissance, when Vesalius made his influential anatomy drawings, dissection has been taught with knife in hand to cut away "extraneous" connective tissue, in order to reveal areas of greater interest (Hedley, 2010; Myers, 2014a; Schleip et al., 2012; van der Wal, 2009). Third, and most confusingly, there are problems with terminology. A congruent and mutually acceptable definition of what actually constitutes fascia, and how to subdivide and define the healthy function of connective tissues has been the subject of ongoing debate among researchers and anatomical nomenclature agencies (Hedley, 2016; Natale et al., 2014; Schleip et al., 2012).

Active Scars

It is of critical importance to clarify the difference between scar tissue that has resolved in a healthy way, and active fibrotic scars that self-propagate for extended periods of time. To be clear, the formation of a certain amount of scar tissue is a normal part of tissue reconstruction during the wound-healing process (Bhardwaj & Parker, 2007; Diegelmann & Evans, 2004; Harding, Morris, & Patel, 2002). When a healthy wound-healing process is complete, tissue layers return to a well differentiated state, and the mobility of each layer normalizes.

The word “active” refers to the ability of an unresolved scar to grow along and through fascial planes throughout the body. Active scars create sticky, dense, and/or calcific deposits. These deposits interfere with normal tissue mobility, gluing the planes where fascia and other connective tissues would have otherwise remained flexible and well differentiated (Kobesova et al., 2007; Lewit, 1979; Lewit & Olsanska, 2004). Places where fascia served to facilitate sliding and gliding become stuck together (Lewit & Olsanska, 2004). Lewit and his colleagues posit that active scars may continue to self-propagate, potentially indefinitely (Kobesova et al., 2007).

Resolved Scars

Normal tissue flexibility allows sliding and gliding of tissue layers to occur, so the natural motion of organs, glands, nerves, and blood vessels is maintained (Barral, J.-P., 1993; Hedley, 2005; Medici, 2016c). Adhesions are made of connective tissue elements (collagen), and act like glue. Certain kinds of collagen fibers act to bind layers of tissue together that would normally be sliding and gliding over each other. Active scars prohibit healthy mobility (range of motion) and motility (inherent rhythmic motion). Resolved scars allow normal range of motion and the motility that organ, muscular, glandular, and vessel structures normally express when they are functioning properly (Barral, J.-P, 1993; Barral, J.-P. & Croibier, 1999; Hedley, 2010; Medici, 2014c; Rolf, 1977; Still, 1908).

Scar Tissue Visualization

Once a scar or adhesion is identified, it is simple work at that point to apply manual cross-fiber techniques and other manipulations to the adhesive tissue to change its viscosity and structure (Cyriax, 1985). Research by Rodriguez and del Rio suggests that this is certainly the case. In their study, they used elastosonography, a specialized kind of

ultrasound, to measure the relative density of connective tissue matrices in injured tissue before and after the application of manual therapy (Rodríguez & del Río, 2013).

In their groundbreaking study, Rodriguez and del Rio devised a specific manual protocol for scar tissue modeling "that attempts to reverse the matrix state from high to low tension, with controlled mechanical [manual] stimuli through the combined use of [the manual techniques of] torsion, shear, traction, axial and compressive vectors on scar tissue" (Rodríguez & del Río, 2013, p. 4). These researchers used elastography to visualize the changing characteristics of scar tissue in real-time during manual manipulation. First, to get a baseline, they measured the local pre-tension in injured myofasical (muscular and fascia) structures. This was significant as a starting point from which to understand whether manual therapy affects the smooth muscle component of fasical response, and the potential for fascial plasticity in scar tissue. Next, the researchers measured a "mechanical dose" of manual soft-tissue techniques applied to the tightened, fibrotic scar of their research subject. Finally, they measured the effects of the manual therapy applied to the scarred myofascial tissue.

The effects of the scar remediation were recorded as a series of images, visualized in real time, as the tissue reacted to the various techniques of force as they were applied. Their research suggests that "fascial stiffness by hypertrophic scars, [is] a relevant etiological factor of muscle injury and relapse" (Rodríguez & del Río, 2013, p. 5). Most importantly, their study showed effects of manual therapy on scar tissue as a visible, measurable change due to hands-on intervention.

Wound Repair

Wound healing is complex, and a thorough explanation of this multi-stage process is

warranted to understand the often-overlooked implications of scar tissue on both local and distal health. Muscles, organs, glands, nerves, blood vessels (capillaries in particular), and genitalia are each affected by scar tissue. Wound healing happens in four, or when scars continue to proliferate, five phases, and these phases overlap. The first phase is hemostasis (Diegelmann & Evans, 2004).

Hemostasis

When the integrity of the tissue is breached during an initial injury, there is degeneration or disruption of the original tissue. As this occurs, blood components make contact with collagen and other factors in the ECM. This contact catalyzes a clotting response and blood thickens and pools in the injured tissue. This is called hemostasis (Diegelmann & Evans, 2004; Mann et al., 2011; Serrano & Muñoz-Cánoves, 2010).

Inflammation

Hemostasis is closely followed by inflammation, the second stage of wound healing. After hemostasis, immune system cells arrive to digest the blood clot and remove debris of the clotting process, such as foreign materials, bacteria, and damaged tissue. The inflammatory process increases blood delivery to the injury, and white blood cells arrive, along with other immune cells, such as neutrophils and macrophages to subdue pathogens at the wound site (Hardy, 1989; Spitalnik, 2007). Pathogenic agents include foreign elements such as dust from surgical gloves, bacteria, viruses, protozoa, and parasites. The inflammatory process protects the injured area from infiltration by pathogenic agents. It does so by activating immune system cells, including those delivered by the blood supply, and immune cells endemic to the ECM local to the injury (Järvinen et al., 2000; Rodríguez & del Río, 2013; Serrano & Muñoz-Cánoves, 2010).

Proliferation and Angiogenesis

The inflammation stage of wound healing is necessary and should be brief (Hardy, 1989). If prolonged, dead and damaged fibers left over from the inflammatory process will interfere with formation of normal, healthy, flexible tissue (Grinnell, 2003; Kjaer, 2004; Langevin et al., 2011; Spitalnik, 2007). As the inflammation process resolves, another wave of immune system cells arrives to begin the process of regeneration, building new tissue to repair the injured site. Immune cells called fibroblasts produce new collagen fibers to form a scaffold for new ECM and other connective tissue elements to organize themselves (Harding et al., 2002). Granular tissue embedded in the ECM is interwoven with newly formed blood vessels to provide blood supply to this freshly forming tissue (CliniMed, 2014). The process of forming new blood vessels is called angiogenesis (Diegelmann & Evans, 2004).

Remodeling

Remodeling is the final stage in healthy wound repair. The tissue will continue to remodel when blood supply is adequate. Fresh blood as a result of successful angiogenesis will supply the necessary oxygen to activate new collagen, and new tissue will form that is flexible and supple. Blood supply, nerve regeneration, and lymphatic flow will be restored and the tissue will heal to a state similar to that which was present before the injury (Diegelmann & Evans, 2004). Tissue remodeling is a process that takes place over a period of months to years (Harding et al., 2002).

Fibrosis

However, when inflammation is prolonged, chronic, or systemic, byproducts of inflammation get sequestered within the thickening ECM. These byproducts act as nerve

irritants, causing nociceptive (pain perception) problems, along with thickening viscosity within the living matrix (Corona et al., 2011; Pischinger & Heine, 1991). This makes it difficult for important cell renewal processes to be completed. Angiogenesis may be compromised, and this, along with other factors leads to stiffened and fibrotic tissue formation (Diegelmann & Evans, 2004; Spitalnik, 2007).

When inflammatory cues cause the over-proliferation of collagen fibers, this results in a thickened ECM, and these thick, fibrotic tissues can over-proliferate. The scar itself becomes a self-propagating, systemic problem (Desmoulière, Geinoz, Gabbiani, & Gabbiani, 1993; Medici, 2013a; Rodríguez & del Río, 2013; Serrano & Muñoz-Cánoves, 2010). This has profound implications for the future health of the body. Thin strands of tough, inelastic fibers spread and accumulate, interfering with patency (through-put without interruption) of many of the body's crucial systems. These include neural input, blood delivery, and lymphatic drainage to and from affected cells (Pischinger, 2007).

As nerve and blood transmission is slowed, sensation and oxygen supplies are blocked. Lymphatic drainage is interrupted, and stagnation occurs in tissues, inviting subclinical infection, and potentially even cancer (Eming et al., 2007). The ubiquitous, intercommunicating microtubular cytoskeleton, winding through the ECM into the nucleus of each cell then programs genetic expression of cellular anomalies instead of cellular health (Eming et al., 2007; Huang & Ingber, 2005; Jaalouk & Lammerding, 2009; Medici, 2013a; Solon, Levental, Sengupta, Georges, & Janmey, 2007; Tozzi, 2012). Stem cells, critical to healing processes and cancer prevention, cannot reach their targets.

CHAPTER 2:

REVIEW OF THE LITERATURE

According to obstetric and epidemiological researchers, the scope of the problem of scar tissue and pelvic adhesions as they relate to sexual pain is difficult to determine, especially since the population in question is women who have given birth (Signorello, Harlow, Chekos, & Repke, 2001; Steege & Zolnoun, 2009). Leeman and Rogers report that up to 83% of women experience some kind of sexual dysfunction, including painful intercourse at 3 months postpartum (Leeman & Rogers, 2012). After exhaustive searching, this researcher found little peer-reviewed literature describing that actively propagating scars or abdominal or pelvic adhesions contribute to the pain or lack of sensation that affects this large group of women's ongoing sexual lives.

According to physical therapist Talli Rosenbaum, a much-published specialist in pelvic floor pain and pathology, the connection between scar tissue and painful intercourse remains unaddressed, and there is little help available for women who suffer from scar-related pelvic pain (Rosenbaum, 2007). To further complicate the picture, many researchers agree that there is limited research about any sexual experiences (either better or worse) of postpartum women as a specific population (Abdool, Thakar, & Sultan, 2009; Baksu, Davas, Agar, Akyol, & Varolan, 2007; Barrett et al., 2000; Connolly, Thorp, & Pahel, 2005; Glazener, 1997).

Obstetrical research suggests that one of the issues with tracking an accurate etiology of scar tissue and its effects on sexuality is related to record-keeping (Hammoud, Gago, & Diamond, 2004). Hammoud implies that long-term postsurgical pain is tracked

back to the initial surgical procedure that produced the scar, rather than tracking any effect of scar tissue itself as an entity. Looking back to the original surgery does not accurately take into account any long-term sexual aftereffects due to scars and/or adhesions.

Abundant research supports that these surgical sequelae (after effects) create adhesion-related problems subsequent to their surgical origins, which can occur over lengthy spans of time (Diamond & Freeman, 2001; Ellis et al., 1999; Hammoud et al., 2004). However, Hammoud and his group report that the name of the surgical procedure, such as a C-section or appendectomy goes into medical records, not the pain or other complications created by scars or adhesions as the consequence of those surgical procedures. Both Tingstedt and Lower submit that medical coding for adhesion-related problems has been inconsistent as well, which makes any scar-related sequelae of surgeries particularly difficult for medical actuaries to track (Lower et al., 2004; Tingstedt, Isaksson, & Andersson, 2007).

While the origins of sexual pain due to scar-related complications may be difficult to track, what is well documented is the range of costs associated with the repair of adhesions and scar tissue. Research has documented that in the US, the estimated annual cost of medical problems that arise from scars and adhesions ranges from the hundreds of millions to the tens of billions of dollars (Arung, Meurisse, & Detry, 2011; Gurtner, Werner, Barrandon, & Longaker, 2008; Ray, Denton, Thamer, Henderson, & Perry, 1998). One cost-of-illness study on adhesiolysis (surgical adhesion removal) found "[a]dhesiolysis was responsible for 303,836 hospitalizations during 1994, primarily for procedures on the digestive and female reproductive systems. These procedures

accounted for 846,415 days of inpatient care and $1.3 billion in hospitalization and surgeon expenditures" (Ray et al., 1998). Clearly, repair of scars and adhesions is very costly. Additionally, many studies report that complications caused by scars and adhesions, including their removal, create a need for ongoing surgical procedures (Ellis & Crowe, 2009; Ellis et al., 1999; Lower et al., 2004; Parker et al., 2005).

Numerous researchers agree the revolving door in and out of the hospital due to surgeries, and adhesions and their aftermath adds to the staggering, but often-underreported cost of adhesions, scars, and other surgical sequelae (Howard, 2000; Ray et al., 1998). In studies from Scotland it is suggested that a mobile population may go to several different hospitals for care, and researchers report that it is virtually impossible to know which scars have been caused by which particular procedures (Lower, Hawthorn, O'Brien, Buchan, & Crowe, 2000). To further complicate matters, In Howard's books, Carter proposes, and others agree, that adhesions formed independently of surgery, such as congenital adhesions, may also be present in abdominal and pelvic cavities (Arung et al., 2011; Howard, 2000; Liakakos, Thomakos, Fine, Dervenis, & Young, 2001; Lower et al., 2000).

The SCAR Studies

In the first comprehensive attempt to quantify the etiology of the nationwide problem of hospital readmissions for patients with problems related to adhesive scar tissue, the Scottish Surgical and Clinical Adhesions Research (SCAR) group mounted three studies. Each of these studies focused on a different aspect of hospital readmissions due to post-operative complications. These studies broke new ground because the

complications tracked were those related solely to adhesions and scar tissue over multi-year periods (Ellis et al., 1999; Lower et al., 2004; Parker et al., 2005).

The first study, SCAR-1, published in *The Lancet* in 1999, followed 21,347 patients who had received abdominal surgery for up to 10 years. SCAR-1 followed patients who underwent numerous kinds of operations, including laparotomy (open abdominal surgery) and laparoscopy, a closed abdomen procedure. The study observed that, "after laparotomy, almost 95% of patients are shown to have adhesions at subsequent surgery" (Ellis et al., 1999, p. 1476). While the authors state that adhesion formation may not have serious consequences for every patient, the statistic is nonetheless sobering.

There is broad consensus that one of the most serious problems caused by abdominal adhesions is small bowel obstruction (SBO), which can be fatal, particularly in the elderly (Arung et al., 2011; Barmparas et al., 2010; Ellis & Crowe, 2009; Flasar, Cross, & Goldberg, 2006; Liakakos et al., 2001). In over 20,000 SCAR-1 patients, 30-41% required re-operative procedures for intestinal obstruction (Ellis et al., 1999). Furthermore, the SCAR-1 study found that 75% of those people who needed re-operation for small bowel obstruction needed this second operation to clean up adhesions resulting from previous surgeries (Ellis et al., 1999). A surprisingly large number of patients were readmitted to hospital more than once as a result of complaints associated with scars:

> 34.6% of the 29 790 patients who underwent open abdominal or pelvic surgery in 1986 were readmitted a mean of 2.1 times over 10 years for a disorder directly or possibly related to adhesions, or for abdominal or pelvic surgery that could be potentially complicated by adhesions. (p. 1476)

In a second SCAR study published in 2004, it was expected that laparoscopy (a closed abdomen procedure) would be a protective approach against adhesion formation but found this was not the case (Lower et al., 2004). The SCAR-2 study compared hospital readmissions from both laparotomy and laparoscopic procedures. The study found "data from the present investigation indicate that gynaecological laparoscopic [closed abdomen] and open surgical procedures are associated with comparable risks of [hospital] readmission for adhesion-related problems" (p. 1884). Lower et al., and subsequent researchers suggest that surgical procedures to remove adhesions (adhesiolysis) seem to only compound the problem of adhesions and their proliferation. Operative times were found to be significantly increased when adhesions were present, putting patients at greater risk due to increased time under anesthesia, and obscuring the operating field, making inadvertent incisions into the gut wall more likely (Lower et al., 2004; Parker et al., 2005).

Many researchers agree that during laparoscopy, even though the abdomen is closed, there is still tissue trauma due to the nature of the surgery being performed (Arung et al., 2011; Barmparas et al., 2010; Lower et al., 2004). Other researchers submit that incisions from robotic procedures cause adhesions to form in a significant percentage of patients, and the inflation of the abdominal cavity using a variety of gasses is also understood to contribute to adhesion formation (Liakakos et al., 2001; Practice Committee of the American Society for Reproductive Medicine in Collaboration with the Society of Reproductive Surgeons, 2007).

The SCAR-2 group noted that additional surgery to remove current adhesions actually caused the regrowth of old adhesions, and additional corrective surgeries subsequently promoted the formation of additional new adhesions (Lower et al., 2004).

Multiple research groups agree that the expectation that closed abdomen procedures would solve the problems associated with adhesions has been virtually abandoned (DeWilde & Trew, 2007; Diamond & Freeman, 2001; Lower et al., 2004).

The SCAR studies made the first statistical connections between the impact of surgery and post-operative pathologies directly related to adhesion formation. These important studies made it clear that surgery inarguably leads to adhesions, and that adhesions cause a wide variety of painful postsurgical complications (Ellis et al., 1999; Lower et al., 2004; Parker et al., 2005). Studies conducted both previously and contemporaneously to the SCAR studies showed correlations between pelvic surgery, pelvic pain, and pelvic adhesions, but did not track post-surgical outcomes over the long term (Diamond & Freeman, 2001; diZerega & Campeau, 2001; Mishell & Davajan, 1991).

Although adhesions were found to be ubiquitous in the SCAR studies, these studies noted that not all adhesions caused pathological outcomes (Parker et al., 2005). "Clearly, a greater awareness of the nature of adhesions is needed" (p. 556). To compound the complex epidemiology of adhesions, they do not occur due to surgery alone. There are a variety of causes for abdominal adhesions. Medical texts state that 50% of women with adhesions have no prior history of surgery, and more than 25% of women who are found to have adhesions (during surgery) have no pre-existing symptoms related to their adhesions (Howard, 2000). The authors of the SCAR-2 study agree with Medici's model that scars and adhesions have multiple origins due to biochemical, biomechanical, and emotionally traumatic events (Lower et al., 2004; Medici, 2012b). Additionally, other researchers report that sexually transmitted infections, chemical irritations, radiation treatments, and endometriosis are among the causes of scars and

adhesions over and above surgery and injuries (Diamond & Freeman, 2001; Schover, 2005; Wiseman, 2008; Wurn, Wurn, Patterson, King, & Scharf, 2011).

Contextualizing Scars: The Four Domains of Health

In Medici's model, the Four Domains of health describe how biochemical, biomechanical, and emotional influences are essential causative factors acting on and within the fourth domain of pathological scars. Each domain has the potential to affect formation of scar tissue, for better or worse (Medici, 2016c). Scientists who analyze connective tissue agree that when there is balanced function within each domain, scar tissue remains a normal part of wound repair, and takes place in the background as a normal part of the healing process (Lewit & Olsanska, 2004; Pischinger, 2007). However, when there is an imbalance within or between of the Four Domains, scars can over-proliferate and any physiological function, including women's sexuality, can be affected (Medici, 2011a, 2016c).

In order to understand scars and adhesions thoroughly, it is important to differentiate between the most apparent causes for these responses to wound healing, which are surgeries and injuries, and less obvious but still crucial causes of scar and adhesion formation. These include infections and immune impairment, postural habits, and even emotional stressors. The literature reviewed in this dissertation show that each of these stressors, although less recognized than surgery or injury, has significant potential to cause the over-proliferation of scar tissue and adhesions, and that imbalance within any of the Four Domains of health contributes to painful sex. The literature also shows strong support for a reciprocal relationship between scar tissue and inflammation.

The Four Domains of health outlined in the last two paragraphs provide an underlying structure for much of this review of literature. Medici maintains that the model of the Four Domains of health is an indispensable tool for assessment (Medici, 2012c). Scars are always part of a larger story, and although their ultimate influence will vary according to one's particular history of postural and/or biochemical imbalance and physical or emotional trauma, each of these domains makes its contribution to the health history of every woman for whom scars are a cause of sexual pain (Medici, 2011a, 2016c).

Scars and Adhesions: Causes of Pelvic Pain

The Standard of Care for Brigham and Women's Hospital (BWH) in Boston defines pelvic pain as "the occurrence of persistent or recurrent episodic pelvic pain associated with symptoms suggestive of lower urinary tract, sexual, bowel or gynecological dysfunction with no proven infection or other obvious pathology" (Markowski, 2011, p. 1). This Harvard teaching hospital's website cites a variety of experts for their definition of pelvic pain, and makes no mention of scar tissue as a pathology that might cause pelvic pain (Abrams et al., 2002; Bo, Berghmans, Morkved, & Van Kampen, 2007; Fall et al., 2004).

However, the work of several researchers suggests that peritoneal and pelvic scars, as well as abdominal and pelvic adhesions, underlie some proportion of the pain and dysfunction described in the standard of care cited above (Arung et al., 2011; Liakakos et al., 2001). Liakakos and his group state that "[a]dhesion formation after abdominal and pelvic operations remains extremely common and is a source of considerable morbidity" (Liakakos et al., 2001, p. 260). Other researchers agree, adding

that scars and adhesions occur both inside and outside of pelvic organs and glands, curtail their function, and cause pain (Binda, 2008; Corona et al., 2011; Sulaiman et al., 2001; Wurn, Wurn, & King, 2009).

Sulaiman and his group found that adhesions contain nerves, which independently generate pain (Sulaiman et al., 2001). Corona and her group found that postoperative inflammation was a causative factor in adhesion formation in their murine (rodent) study (Corona et al., 2011). Binda's murine studies on laparoscopic procedures supports these findings. Looking at inflammation and other complications in a closed abdomen environment, Binda suggests that laparoscopy has inflammatory effects that promote adhesion formation (Binda, 2008). The substantial and significant previous research provided by the SCAR-2 study shows that these "less invasive" procedures contribute to adhesion formation in equal measure to more invasive open abdominal surgery when their effects are measured and compared over time (Ellis & Crowe, 2009; Lower et al., 2004).

Engeler and his colleagues in the European Association of Urology take a more holistic view in their approach to defining pelvic pain than Brigham and Women's Hospital website:

> Progress in the science of pain has led pain specialists to move away from an organ-centred [sic] understanding of pain located in the pelvis to an understanding based on the mechanism of pain and integrating, as far as possible, psychological, social, and sexual dimensions of the problem. (Engeler et al., 2013)

What is notably missing from both BWH and Engeler's definitions of pelvic pain is any specific mention of scar tissue, or that pelvic or abdominal adhesions could contribute to

or directly cause pelvic pain. Alternatively, Dutch researcher Bakkum and his group agree with Binda that adhesion formation, as well as subclinical postoperative infections, are causes of pelvic pain: "[p]ostsurgical adhesions are a frequently ensuing and well-known complication after abdominal surgical procedures. Adhesions may interfere with the functions of abdominal structures and are thus able to cause chronic pelvic pain (Bakkum et al., 1995, p. 1283).

Bakkum's murine research found certain suture materials caused increased adhesion formation. This study was significant because previously these surgical materials had not been identified as primary causes of inflammatory reactions, or adhesion formation (Bakkum et al., 1995). Ample research supports that surgical repairs related to childbirth and other life events are common, and choice of suture material is a possible variable that affects women's abdominal areas, pelvic floor, and genital health (Albers & Borders, 2007; Attard & MacLean, 2007; Bakkum et al., 1995; Cioffi, Swain, & Arundell, 2010; Kapustian et al., 2012). Albers concurs with Bakkum's research, adding that both suture technique and suture material are causes of postpartum morbidity. Research contributed by Bakkum, Kapustian, and Albers reports that suture materials promoting inflammatory reactions, leading to local tissue adhesion, are routinely used in hospital and midwifery settings (Albers & Borders, 2007; Bakkum et al., 1995; Kapustian et al., 2012).

While surgery and injury are well documented as primary causes of scars and adhesions, what is less well understood is that the three remaining domains of health (biochemistry, biomechanics, and emotions) also contribute factors that directly cause or influence scar tissue propagation. In a white paper on painful sex, the American College

of Obstetricians and Gynecologists proposes that each woman's own history of childbirth, surgery, cancer treatment, and infection creates a unique scenario that may result in painful sex (American College of Obstestricians and Gynecologists, 2011). It is again notable that scar tissue as a cause of sexual pain is not mentioned in this influential article. This review of literature reveals scar tissue as a common outcome, not only of surgical procedures, and suturing materials, but also of acute and chronic injury cycles, cancer treatment, childbirth injury, emotional trauma, and infection. A brief review of the relationship between the Four Domains model and scars is provided below.

Biomechanics

In the mid-1970s somatic educator and connective tissue pioneer Ida Rolf, and later her students, described how fascia adapts to inputs from our immediate surroundings (Bond, 2007; Johnson, 1977; Rolf, 1977; Schultz & Feitis, 1996). Rolf taught that these adaptations are expressed as postural habits, which reflect our relationship to gravity, mediated by a broad range of stressors (Rolf, 1977, 1989). In the mid-1990s, holistic health teacher and radio commentator Vincent Medici DC agreed with Rolf, by articulating the importance of understanding that four essential health domains determine how fascia expresses health throughout the body (Medici, 2013d). Medici's thesis continues to be that emotional stress, biomechanical stress, biochemical stress, and stress caused by the over-proliferation of scar tissue itself drives the tension, tone, viscosity, and functional communication of fascia (Medici, 2012d). Medici emphasizes that the biomechanical or postural domain of health is central to the formation and perpetuation of scars and adhesions and contributes to scar-related pain.

Rolf submits, and subsequent fascia researchers agree, that scars can be understood as physical artifacts of fascia's maladaptive patterning (Hedley, 2005; Rodríguez & del Río, 2013; Rolf, 1977). Other researchers and clinicians concur that posture and postural habits have a great impact on the healthy function of all body tissues via their effects on fascia (Oschman & Oschman, 1995a; Serrano & Muñoz-Cánoves, 2010). Citing Rolf, Medici notes that postural habits cause tissues to adhere to each other via pressure and friction, creating fascial adhesions and scar tissue (Medici, 2013d; Rolf, 1989). Along with the writings of Rolf, recent research supports that scars are capable of proliferating such that they affect overall health at sites significantly distant to an original postural habit or injury (Pischinger, 2007; Rodríguez & del Río, 2013; Rolf, 1977; Serrano & Muñoz-Cánoves, 2010).

In a short video about the importance of fascia, joint function, and movement for a healthy body, researcher and dissection expert/instructor Gil Hedley PhD suggests that tissue or body immobilization causes "otherwise sliding surface[s]" to stick together (Hedley, 2005). In this popular video, Hedley submits that protecting an injured joint by not moving it normally increases intertissue adherence and contributes to dysfunctional movement patterns. He uses an example of an injured shoulder to demonstrate lack of movement as a protection strategy for a muscle injury. He proposes these results progress over time, and maintenance of healthy movement and healthy tissue is a use-it-or-lose-it proposition. Hedley indicates that as injuries create limited movement patterns, these movement limitations allow adhesions to propagate, "and we get all fuzzed over."

Biochemistry

Abundant research describes the process of scar formation and wound repair, in which the biochemistry of inflammation and its effects on connective tissue are explained in detail (Bataller & Brenner, 2005; Beyer & Distler, 2013; Eming, Krieg, & Davidson, 2007; Hardy, 1989; Henderson & Sheppard, 2013; Hinz, 2015). Researchers across many disciplines agree that under inflammatory circumstances, the local biochemical milieu causes collagen over-proliferation, producing excessive and self-propagating scar tissue (Hardy, 1989; Henderson & Sheppard, 2013; Hinz, 2015; Lewit & Olsanska, 2004). Understanding the relationship between pelvic pain and painful sex requires clarity of the distinction between scar tissue, active scars, and adhesions, and the biochemical environment that produces this critical range of wound repair outcomes. The Definitions section of this dissertation describes this information in detail, but a brief overview of these distinctions is provided here.

During a long career describing the functional consequences of scars, manual therapy pioneer and educator Karl Lewit MD and his colleagues in the Czech Republic indicate that after wound healing has been successfully completed, once-wounded tissues will revert to healthy movement and differentiation from each other (Kobesova & Lewit, 2000; Kobesova, Morris, Lewit, & Safarova, 2007). As tissues return to healthy differentiation, they also return to normal biochemical function and normal range of motion. Lewit explains that in overly inflammatory conditions, pathological scars form, and fail to establish such normal, healthy tissue differentiation (Kobesova & Lewit, 2000; Kobesova et al., 2007; Lewit & Olsanska, 2004). Lewit also notes with some frustration that “the topic of scar tissue complications following the initial healing phase were

currently of no clinical interest to surgeons in the Czech Republic" (Lewit & Olsanska, 2004, p. 234).

Lewit defines pathologically adherent tissues as "active scars," and found in his research, as did Rolf, that scars and adhesions have self-propagating properties, which lead to myofascial pain sometimes at a surprising distance from the site of the original injury (Kobesova & Lewit, 2000; Kobesova et al., 2007; Lewit & Olsanska, 2004; Rolf, 1989). Hardy and others concur, describing that when the immediate chemical environment in which wound repair occurs is inflamed, the normally self-limiting inflammatory chemical cascade goes rogue and the wound repair process itself becomes a chronic condition (Hardy, 1989; Henderson & Sheppard, 2013).

Hardy describes scars as the glue of the body, produced by a highly orchestrated sequence of chemical reactions (Hardy, 1989). As Hardy and others describe, when inflammation is chronic, scars themselves promote chronic inflammatory chemical production. This results in overproduction of stiff and sticky collagen fibers that glue, thicken and cause stiffness to normally gliding surfaces all over the body (Guimberteau & Armstrong, 2015; Hardy, 1989; Hedley, 2005; Henderson & Sheppard, 2013; Hinz, 2015).

Pischinger states that in the 1800s, Eppinger suggested that adhesions between tissues create blockage against normal fluid movement, creating microcirculation problems that disturb local cellular physiology (Pischinger, 2007). In his seminal work *The Extra Cellular Matrix and Ground Regulation*, Alfred Pischinger describes the problem of metabolic chemical processes of the extra cellular matrix (ECM) when exposed to chronic inflammation. The work of Hardy, Hinz, Lewit, and Henderson &

Sheppard corresponds with Pischinger's description that these chemical processes produce an environment in the ECM capable of promoting ongoing and active scar propagation, curtailing the healthy differentiation of tissues from each other. Pischinger and later Hinz, author of *Matrix Biology* (2015), explain that when granular products of inflammation (fibrin, inflammatory cytokines, aberrant collagen species and other chemicals) build up in the ECM, the healthy function of that tissue will be lost (Hinz, 2015; Pischinger, 2007).

The work of Pischinger, and many others describe how when the ECM thickens or granulates, the resulting reduction in fluid movement and neural information transfer interferes with normal tissue function at minute levels, in addition to having an impact on healthy wound remodeling (Arung et al., 2011; Binnebösel et al., 2008; Mann et al., 2011; Pijlman, Dörr, Brommer, & Vemer, 1994; Pischinger, 2007). Additional literature supports that these adhesive processes have the potential to interfere with normal, healthy, sexual physiology (Meston & Bradford, 2007; Rathfisch et al., 2010; Rosenbaum, 2007; Wurn et al., 2009). Although not explicitly stated, this would, by definition, include the healthy function of pelvic floor muscles and genital tissues.

A technical bulletin for surgeons published by the Practice Committee for the American Society for Reproductive Medicine (ASRM) describes many provocations that produce adhesions. These include inflammation from "sharp, mechanical or thermal injur[ies], infection, radiation, ischemia, desiccation, abrasion, or foreign-body reaction[s]" (Practice Committee of the American Society for Reproductive Medicine, 2006, p. 21). The ASRM emphasizes that each of these causes of inflammation may be encountered singly or in combination during a woman's life.

Emotion

In addition to inflammatory stressors, emotional stressors have also been documented to affect efficacy and efficiency in wound healing (Gouin & Kiecolt-Glaser, 2011; Kiecolt-Glaser et al., 2005). The concern of the Practice Committee for the ASRM cited above is for the future fertility of women who have undergone gynecological surgery, yet women's sexual pleasure remains unaddressed (Practice Committee of the American Society for Reproductive Medicine, 2006). By contrast, in their in-depth investigation into dyspareunia (painful intercourse), Steege and Zolnoun state that sexual pain after invasive gynecological procedures warrants increased attention from medical practitioners (Steege & Zolnoun, 2009). They emphasize that pleasurable aspects of intercourse facilitate intimacy and are at least as important as the mere ability to engage in coitus: "[t]he outcomes of medical and surgical treatments for common gynecologic problems should routinely go beyond measures of coital possibility, to include assessment of coital comfort, pleasure, and facilitation of intimacy" (Steege & Zolnoun, 2009).

In their book *The Science of Orgasm* (2006), Komisaruk, Beyers-Flores, and Whipple report that genital function and the potential for pleasurable sensation depend on the patency (throughput) of fluid flow. Midwife and award-winning sex educator Sheri Winston states that vascular delivery, arrival of neural impulses, and adequate, timely drainage of blood and lymph to and from erectile tissues embedded in the female genitals combine in an exquisitely timed dance to create sexual pleasure (Winston, 2010). Meston and her research group concur in their exhaustive literature review about female arousal

and orgasm from biochemical, biomechanical, and emotional perspectives (Meston, Levin, Sipski, Hull, & Heiman, 2004).

Both Pischinger and Lewit suggest that active scars cause physical blockage and interrupt the timing of normal physiologic events when they propagate in and around any of the body's tissues. In their work, each researcher maintains that pathological scars interrupt fluid exchange and block neural messaging (Kobesova & Lewit, 2000; Kobesova et al., 2007; Pischinger, 2007). Given that genital function and the potential for pleasurable sensation depend on the patency (throughput) of fluid and nerve flow, and given that pathological scars interrupt fluid exchange and neural messaging, and thus normal physiologic function, it follows that scarring interrupts the requisite factors that allow for pleasurable sex. The exquisitely timed dance that creates sexual pleasure would be interrupted by physical blockage caused by scar tissue.

Levin submits that when sex is painful, it indirectly suppresses sexual desire (Levin, 2002). In both their scientific research and their book for consumers, Belinda Wurn, PT, and her husband Larry state directly that scars and adhesions interfere with the requisite sequence of events that contribute to successful desire and arousal for women (Wurn et al., 2009; Wurn et al., 2011; Wurn et al., 2004). The Wurns describe how scars create problems with sexual function, pleasure, and fertility for women. The Wurns' work points out that when scar tissue and adhesions are present, a loss of sensation or lubrication, or the increase of pinchy, painful friction over women's delicate genital tissues will follow (Wurn et al., 2009).

The Wurns' work is focused on women with scars, adhesions, painful sex, endometriosis, and infertility. They describe how adhesions cause pain and occur as a

result of inflammation caused by endometriosis, infection, surgery, and injury (Wurn et al., 2009). In their book, they also include sexual abuse as an emotional and physical cause of sexual pain (Wurn et al., 2009). Their research suggests manual therapy applied to scars successfully alleviates pelvic pain, painful sex, and infertility (Wurn, Heuer, & Hornberger, 2008; Wurn et al., 2011; Wurn et al., 2004). These studies and others will be highlighted in this review of literature. First it will be useful to review the evolution of our collective understanding of fascia before contextualizing it within the four essential domains of health, including the domain of scar tissue.

An Evolving Understanding of Fascia

Theoreticians of living systems, anatomists, and practitioners of holistic medicine agree that fascia could arguably be considered the most "holistic" tissue of the body (Chaitow, 2012a; Ho, 1997; Oschman, 2005; Schleip, 2003b). Fascia is widely described among these diverse specializations as an inter- and intra-cellular system for the delivery of information: contacting each vessel, nerve, organ and tissue inside our living flesh (Ho, 1997; Oschman, 2009; Oschman & Oschman, 1995a; Pischinger, 2007; Pischinger & Heine, 1991; Tozzi, 2014). Medical researchers find this important because scar tissue affects the behavior, genetic, and epigenetic expression of fascia, and all of the structures to which fascia connects (Alvarez, Vollmann, & von Andrian, 2008; Arnsdorf, Tummala, Castillo, Zhang, & Jacobs, 2010; Ingber, 2010).

The literature shows strong parallels between definitions of fascia and definitions of holism. If one looks at holism and the accounts of biophysical healing that exemplify the promise of holistic health, one might extract an accurate definition of fascia. In the book *Holism in Biomedicine*, Young defines holism as "a system whose components are

connected by reciprocity, interdependence, or feedback" (Lawrence & Weisz, 1998, p. 238). From biophysicists to bodyworkers, there is agreement that this phrase is an accurate descriptor of the properties of fascia as well as holism (Findley & Shalwala, 2013b; Oschman, 2006; Pischinger & Heine, 1991; Schleip, 2003b). We have seen that diverse specialists within the discipline of holistic health agree that fascia acts as a connector from one type of tissue to another. Others speculate that fascia forms a bridge, not only between body and mind, but also between the conscious and unconscious mind (Ho & Knight, 1998; Juhan, 1995; Oschman & Pressman, 2014).

Many researchers have used this vital living matrix of tissue as a metaphor for communication and expression of health throughout the entire cellular continuum (Ho & Knight, 1998; Juhan, 1995; Oschman, 2009; Oschman & Pressman, 2014; Pischinger, 2007; Pischinger & Heine, 1991).

> The living matrix has no fundamental unit, no central aspect, no part that is primary or most basic. The integrity of the network depends on the activity of all components, and all components are governed by relations with the whole. (Oschman & Oschman, 1995a, para 43)

In 1899 Andrew Taylor Still stated in his book, *Philosophy of Osteopathy* that:

> The fascia is universal in man and equal in self to all other parts, and stands before the world today the greatest problem, the most pleasing thought. It carries to the mind of the philosopher the evidence, absolute, that it is the "material man," and the dwelling place of his spiritual being. (Still, 1899, p. 163)

Ever since Still's attribution of mystical properties to fascia, students of health, form, and function have perceived and described fascia as a responsive, sculptural medium of

consciousness that responds to our thoughts, actions, and importantly, to our beliefs (Lipton, 2005; Milne, 1995a; Tozzi, 2014).

Some experts in the manipulation of fascia describe its changes in shape, viscosity, and tension resulting from receipt and quality of deep physical contact. These inputs translate as biomechanical information, creating fascial change as a result of pressure and friction (Chaitow, 2008; Chaitow, Findley, & Schleip, 2012; Cyriax, 1985; Rolf, 1977; Simmonds, Miller, & Gemmell, 2012). Modern biologists and anatomists relate that changes in the plasticity of the web of fascia distributed throughout the body may be triggered by certain bioelectrical impulses generated by the autonomic nervous system (Pischinger, 2007; Pischinger & Heine, 1991; Schleip, 2003b, 2003c). Schleip proposed that cues include those generated by the emotional body and are associated with one's immediate perception of safety via the autonomic nervous system (Schleip, 2003b, 2003c).

Yet another group of researchers argue that changes in fascial tone are driven by biochemical inputs from both the endocrine system and the brain (Kjaer, 2004; Myers, 2014a, 2014b; Pert, 1997). Medici's model of the Four Domains of health suggests that changes in fascia are induced by each of the Four Domains and include the ability of scar tissue to introduce limitations on fascial elasticity and behavior (Medici, 2012c, 2013d, 2016c). Supporting this perspective, new research and imaging techniques have shown that scar tissue is a driver of fascial tone and behavior (Comesaña et al., 2017; Rodríguez & del Río, 2013).

By contrast, conventional medicine and many modern physiology textbooks do not characterize fascia as significant in the determination of overall health; it is readily

apparent that fascia is not defined in these books as an intelligent organ of intercellular communication (Chaitow, 2012a; Guyton & Hall, 2000; Schleip, Jäger, & Klingler, 2012). “Fascia” is not listed as a heading in these tables of contents and has minimal representation (if any) in their subject indices (Guyton & Hall, 2000; Scanlon & Sanders, 1997; Schleip et al., 2012). Modern medical textbooks state that it is the nervous and circulatory systems that are mediums of delivery for electrical and chemical information throughout the body, acting as the acknowledged regulators of physiologic function. By contrast, A. T. Still offered that the role of fascia is centrally causative in both health and disease in his seminal contributions to the osteopathic literature over 100 years ago:

> Fascia is the place to look for the cause of disease and the place to consult and begin the action of remedies in all diseases. By its action we live and by its failure we die. The fascia is the ground in which all causes of death do the destruction of life. (Tozzi, 2012, p. 507, quoting Still)

More recently, the burgeoning worlds of connective tissue and medical research are beginning to support Still’s views that the fascial system constitutes a holistic matrix of tissues that largely determines the expression of health in the body (Pischinger, 2007). This support ranges from the level of gross posture and physical structure (Hedley, 2010; Stecco & Schleip, 2016; Tozzi, 2012) to minute levels of cellular and genetic expression (Comesaña et al., 2017; Mammoto & Ingber, 2010; Pischinger, 2007; Pischinger & Heine, 1991).

In the new view of fascia embraced at the Fascia Research Congresses, fascia is no longer characterized as an inert material that merely provides connection and support for adjoining structures (Chaitow, 2012a; Chaitow et al., 2012). Connective tissue

researchers now publish that fascia is a ubiquitous matrix of living elements, which have physiologic and biochemically active properties (Schleip et al., 2012; Tozzi, 2015a). Although there has been a lack of recognition for fascia's active role as a governor of overall health in standard educational texts, medical research after the year 2000 recognizes that connective tissue components play a central role in determining healthy immune and stem cell functions (Alvarez et al., 2008; Arnsdorf et al., 2010). In the 21st century, fascia is increasingly being investigated for its active role in producing pathology, including heart, kidney, and liver disease, as well as cancer (Baicu et al., 2003; Fadeel & Orrenius, 2005; Friedman & Bansal, 2006; Ingber, 2006; Pischinger, 2007).

Disparate disciplines of holistic medicine suggest a role for fascia as the crucible for somatic change, including osteopathy, acupuncture and deep bodywork (Johnson, 1977; Langevin, 2006; Myers, 2014a; Oschman, 2009; Rolf, 1977; Schultz & Feitis, 1996; Tozzi, 2015a). Both fascia researchers and manual therapists assert that we are actually governed by it (Johnson, 1977; Rolf, 1977; Schultz & Feitis, 1996; Tozzi, 2015a). More so than muscle fibers, it is in fascia that the effects of bodywork are realized (Myers, 2001; Rolf, 1989; Schultz & Feitis, 1996). There is accumulating support that fascia influences all of the tissues that it surrounds and penetrates, be they muscular, neural, vascular, endocrine, or immunological organs in their own right, even down to the minute level of cellular nuclei (Myers, 2014a; Oschman, 2009; Pischinger, 2007; Pischinger & Heine, 1991; Rolf, 1989; Tozzi, 2015a).

> The living matrix gives the body its overall shape and features, defines the form of each organ, tissue, and cell, and extends into every nook and cranny of the

> organism. All movements are generated and conducted within this substance. The expanded view of the connective tissue provides a physical, physiological, energetic, and conceptual substrate for a communication network that extends throughout the organism. The nervous system is the most widely studied communication system in the living matrix, but it is by no means the only one. (Oschman & Oschman, 1995a, para 11)

According to Pischinger, scar tissue interrupts both the communication and physiologic functions of connective tissue (Pischinger, 2007). Pischinger asserts that the overall health of the body is compromised when scars and adhesions, which exert their detrimental effects at a significant distance from the location of the primary wound or infection, are not resolved.

To follow the evolution of our understanding of fascia, some of the literature describing human dissection techniques, nomenclature, and anatomical illustration must first be examined. Fascia researchers Schleip, Jager, & Klingler state that "fascia has been extensively overlooked in mainstream medicine over the last few decades, and its contribution to many areas of biomechanics and physiology has been underestimated" (Schleip et al., 2012, p. 496). In their paper "What is Fascia? A Review of Different Nomenclatures," the authors suggest that fascia has been largely ignored in mainstream medicine due the use of regional dissection to teach anatomy to medical professionals.

According to the work of Ghosh, Schleip, and his colleagues, and others, from its inception in the 1500s, cadaveric dissection as made popular by Vesalius, was carried out using a knife or scalpel to cut away what was "extra" in order to reveal each particular target of interest for medical study (Findley & Shalwala, 2013a; Ghosh, 2015; Schleip et

al., 2012). As the practice of dissection progressed, each targeted tissue—muscle, organ, vessel, bone, or gland—was measured, counted, and named. But Schleip and his colleagues suggest that fascia and other connective tissues were systematically removed to reveal these learning targets, and largely left unstudied, non-quantified, and fundamentally misunderstood in their functions (Findley & Shalwala, 2013a; Ghosh, 2015; Schleip et al., 2012; van der Wal, 2009).

Medici has compared conventions of Western anatomical illustration passed down through the history of medicine, which typically portray fascia and other connective tissues as that which obscures, with a more dynamic Asian medical model of connective tissue. According to Medici, in Chinese medicine, tendons and other connective tissues are considered organs, in their own right, with their own distinctive functions. Medici and others contrast Western medical definitions of connective tissue as inert, with Chinese medical concepts that convey tendons, fascia, and ligaments as having "organ" status, acting and respected as carriers of and storage for life force, or *qi* (Beinfield & Korngold, 1991; Johnson, 1994; Johnson, 2000; Kaptchuk, 1983; Langevin, 2006; Medici, 2013d).

Many modern fascia researchers have been critical of the way fascia has been portrayed in conventional anatomy texts and have published critiques that question the teaching of regional anatomy as the standard for medical professionals. Findley and many other fascia specialists write about the confusion created because fascia is named regionally: for the bones, muscles, and organs it connects, without regard for its global function as an intersystem organ of communication (Avison, 2015; Findley & Shalwala, 2013a; Schleip et al., 2012; van der Wal, 2009). According to Findley, regional names distort the accurate understanding of the unified reach, coordinating, and structural

properties of fascia and other connective tissues (Findley & Shalwala, 2013a). As we will see, biophysicists (Ho, 1997; Oschman & Oschman, 1995a), yoga teachers (Avison, 2015; Forrest, 2011), osteopaths (Chaitow, 2012c; Tozzi, 2015a), Structural Integrators (Myers, 2014a; Schleip et al., 2012), and fascia researchers (Findley & Shalwala, 2013a; Ingber, 2010; Levin & Martin, 2012; Rasmussen, Karampuwala, Vaidyanath, Jensen, & Hameroff, 1990; Staubesand & Li, 1996; van der Wal, 2009) each ascribe communication functions at various levels when describing the workings of fascia, from macro- to sub-microscopic levels.

Medical doctor, anatomy professor, and embryologist Jaap van der Wal has made important contributions to the study of fascia. Van der Wal has been described by fellow researchers as "one of the most passionate Renaissance thinkers in the anatomy world" (Myers, 2015, para 1). Van der Wal's work suggests that fascia, tendons, aponeuroses, and ligaments play causative and quite active roles in bony movement and are far from the inert mechanical structures described in most college-level anatomy courses. Followers of van der Wal's work report that his novel fascia-sparing dissections in the 1980s revealed both the continuity and movement-initiating functions of fascia (Myers, 2015). Fellow scientists claim that his controversial research managed to do this in a way that radically challenged the conventional approach of educational paradigms in medicine and human biomechanics and was ignored for many years (van der Wal, 1988).

In recent lectures and publications, van der Wal has suggested that anatomy is an artificial construct created by the mind (and the knife) of the dissector, who wields the scalpel to reveal what they expect to see. Van der Wal maintains this is due to the conditioning of conventional medical and anatomical education, which shows typical

connective tissue conformations that follow traditional conventions of dissection. He and others explain that we are conditioned to believe that these illustrations are functionally accurate (Avison, 2015; Findley, Chaudhry, Stecco, & Roman, 2012; van der Wal, 2009). He and his followers suggest that the process of dissection, along with the conditioning of the dissector obscures the accurate understanding that fascia is a primary mover of bone, on par with muscle. This seems obvious once it is acknowledged that muscles are connected to bone via tendonous connective tissues. Rather than running as a system of parallel support, subordinate to the primacy of muscle, van der Wal and his followers maintain that mechanoreceptors in tendons and fascia also initiate the impulse to move (Findley et al., 2012; van der Wal, 2009).

Van der Wal's research suggests that fascia and aponeuroses (flat tendonous sheets of dense connective tissue that act to separate muscle bundles) are full of mechanoreceptors. As such, they are exquisitely responsive to movement cues, and act as a sensory substrate. He reports that tendons and aponeuroses, far from being inert mechanical support structures, are sensory organs in their own right and respond to the prompting of the nervous system by acting with great and accurate immediacy (van der Wal, 2009).

In an online video of his keynote address to the 2009 Second International Fascia Research Congress, van der Wal asserts that "[t]he first thing you learn in dissection is to clean the muscles, but you remove all the connective tissue and cannot actually learn about muscle function without the fascia" (van der Wal, 2009). According to Medici, (personal communication, April 14, 1999), van der Wal's characterization of the autonomous communication function of fascia is surprisingly like the Chinese definitions

of tendons and other connective tissues as holders and movers of *qi,* or life force (Medici, 2013a; 2013f). Joanne Avison, yoga teacher and author of the book, *Yoga, Fascia, and Movement* (2015), agrees that van der Wal's findings imply that sentience is a primary quality of fascia (Avison, 2015; van der Wal, 2009). She states that, "it redefines the qualities, transitions, and characteristics of *how* we sense and what parts of us are actually *sensing*" (p. 160). If fascia has sentience, and scars express themselves as fascial restrictions, does scar tissue restrict our sentience as well?

Autonomic Influence on Fascia via Smooth Muscle

The literature reveals there is much to be learned about fascia in addition to van der Wal's novel views about fascia's changing status as a driver of biomechanics in human movement. As early as 1936, Hans Selye described autonomic reactions to alarm as "the non-specific neuroendocrine response of the body," indicating intertwining roles for hormonal, biochemical, and neurological reactions to stress (Szabo, Tache, & Somogyi, 2012, p. 474). In 1956, Selye published his landmark book *The Stress of Life*, describing the dynamic reactions of fascia and other connective tissue to the inflammatory process, including the formation of scars, along with many other physiologic responses to threat (Selye, 1936; Szabo et al., 2012). Selye's book was aimed at the public, but his research linking stress to reactivity and pathology throughout the body's many systems had a profound impact on the medical world, and Selye's students note that he was nominated for the Nobel Prize 10 times (Szabo et al., 2012).

According to Szabo et al., Selye describes the inflammatory process and ensuing formation of scar tissue as "a positive reaction against [injury]" (Szabo et al., 2012, p. 131). Selye received vigorous critique of his work for defining stress as both cause and

effect of nocuous agents, which showed effects across the body's biochemical, biomechanical, and emotional substrates (Selye, 1956). Mirroring Selye, Medici suggests that scar tissue itself has a similarly reciprocal relationship; that it is caused by, and then creates, stress throughout the body and each of its systems (Medici, 2016c; Selye, 1936, 1956; Szabo et al., 2012).

Selye devoted an entire chapter of *The Stress of Life* to disagreements about his work, borrowing the title of this chapter, "When Scientists Disagree," from Walter Cannon, whose work defining homeostatic balance as the primary objective of autonomic function was seminally influential on Selye's own stress research. Perhaps ironically, Cannon himself was an early critic of Selye's ideas about stress as a creator of adaptive responses modulated by the endocrine system (Selye, 1956). Selye notes that new theories in science are rarely met without skepticism, and that his own theories about the reciprocal relationship between physiologic causes and effects of stress were such that they invited this and much additional controversy. Currently, the many publications by Robert Schleip and his colleagues at the University of Ulm support Selye's assertions that connective tissue is subject to autonomic influences as a result of stress (Schleip, 1991, 1993, 2003a, 2003b; Schleip, Klingler, & Lehmann-Horn, 2006).

Schleip agrees with the perspective of Avison, van der Wal, and Findley, who each characterize that fascia and other connective tissues are traditionally taught as being fairly passive elements that contribute to joint stability (Schleip, Jager, & Klingler, 2012). Given that this continues to be the standard of medical education and was certainly so during the time that Selye published his work, it is not surprising Selye's holistic perspective linking a cause-and-effect relationship of stress to active, dynamic wound

healing was viewed with dismay. Schleip and his group argue vigorously with this conventional perspective, by citing Staubesand and Li's research from 1996, which found smooth muscle cells located in layers of fascia covering the junction of the thoracic and lumbar spine (Schleip, 2003b, 2003c; Schleip et al., 2006; Staubesand & Li, 1996).

Schleip points out that smooth muscle, governed by the autonomic nervous system, will contract as a response to stress, stating "[f]ascia and the autonomic nervous system appear to be intimately connected" (Schleip, 2003a, abstract). Schleip insists that it is possible to measure actively changing fascia that results from manual therapy, which "cannot be explained by its [fascia's] mechanical properties alone. Fascia is densely innervated by mechanoreceptors which are responsive to myofascial manipulation. They are intimately connected with the central nervous system and specially with the autonomic nervous system" (Schleip, 2003b, abstract).

Schleip and his group have published that fascia responds to autonomic cues (Schleip, 2003c). This is a step forward in the evolving understanding of fascia, and Schleip implies that it is now clear that "[i]nterestingly, compared with muscular tissue's innervation with muscle spindles, the fascial element of it is innervated by approximately six times as many sensory nerves than its red muscular counterpart" (Schleip, 2013, para 6). Schleip recounts that many manual therapies are aimed at communicating directly with fascia itself, rather than muscular targets to effect tensional change (Schleip et al., 2012).

As trauma specialists describe, the autonomic nervous system (ANS) responds to emotional and survival-based cues at an unconscious level (Lanius, Paulsen, & Corrigan, 2014; Scaer, 2012; van der Kolk, 2014). Schleip and his colleagues have argued that the

ANS acts on smooth muscle cells found within fascia (Schleip et al., 2006). As a student of Ida Rolf, Schleip is familiar with Rolf's assertion that when adhesions in the fascia spread, they cause physiologic dysfunction in areas surprisingly distant from the site of an initial injury (Rolf, 1977; Schleip et al., 2006). Structural Integrators submit that when tension generated by the ANS runs high, such as after emotional trauma or injury, unconscious tensional patterns contribute to postural habits, creating diffuse yet painful fascial adhesions (Rolf, 1977).

The combined work of Schleip, Bond, Selye, and others suggests that increases in fascial tone results from an over-activation of the stress response, or dominance of the sympathetic branch of the ANS (Bond, 1999; Schleip, 2003b, 2003c; Selye, 1956). Medici's teaching supports the likelihood that when stress is constant, smooth muscle fibers within fascia will remain contracted, and be reflected by tight fascia and muscle tone (Medici, 2012d, 2013d; Schleip, Klingler, & Lehmann-Horn, 2004). Medici promotes that when the stiffening effects of scars are taken into account, posture will be affected, and produce a tightly bound, inelastic structure. Both anatomic and scar-related research report that this stiffened structure will be difficult to reverse without the skilled intervention of trained practitioners (Medici, 2012d).

Tensegrity and Biotensegrity

Fascia researcher and yoga teacher Joanne Avison asserts that the 1960s saw the creation of the term "tensegrity," coined by R. Buckminster Fuller (Avison, 2015). Tensegrity was Fuller's description of the dimensionally dynamic sculptures of his student Kenneth Snelson. Fuller shortened the ideas of "tensile" and "integrity" into one word, eventually birthing novel architectural structures along with new linguistic ideas

(Avison, 2015; Fuller, 1962). Avison describes the development of the term tensegrity and its evolution into the term biotensegrity as a way to describe the tensile support inherent in much of biological movement within the earth's gravitational field (Avison, 2015; Fuller, 1962).

Avison credits the creation of the concept of biotensegrity to Stephen Levin, MD, whose career in orthopedics put him at odds with conventional biomechanical descriptions of human movement acquired during medical school (Avison, 2015; Levin & Martin, 2012). Levin and many others argue that biotensegrity is more than a new way to describe human biomechanics, it is an accurate descriptor for the way our cells build themselves, which seems to fly in the face of Newtonian physics (Avison, 2015; Levin & Martin, 2012). French hand-surgeon and fascia documentarian Jean Claude Guimberteau agrees, stating that:

> Connective tissue is in fact the constitutive tissue and we could say that fascia is a tensional, continuous fibrillar network, extending from the surface of the skin to the nucleus of the cell—this network is global, adaptable, fractal, irregular, and it is a basic structural architecture of the human body. (Guimberteau, 2016)

The work of Levin, as well as that of Guimberteau, and Ingber suggests that cells and their substructures demonstrate properties of biotensegrity, with tiny microtubules acting as minute tensile elements of cellular support (Guimberteau, 2016; Ingber, 1993a; Levin & Martin, 2012).

Donald Ingber serves as head of the Wyss Institute at Harvard. This advanced research unit was conceived during the first decade of the 21st century to investigate minute cellular mechanics for novel applications at the leading edge of medical research

(Ingber, 2010). Ingber has demonstrated that biotensegrity elements of "mechanics and structure are as important regulators of cell and tissue function as chemicals and genes" (p. 16).

Ingber's research into cytoskeletal structure and behavior suggests that structural stress is transmitted by the cytoskeleton through the cell membrane. He reports that this action creates some portion of cellular behavior, resulting from these mechanical forces being transmitted through the nucleus directly into the DNA, which ultimately affects gene expression (Ingber, 2010). The implication here is that scar tissue creates tensional networks of stress that are at odds with normal tissue function and formation. According to Ingber, irregular behavior in cells can be traced back to aberrant tensional networks within the connective tissue matrix surrounding those cells. These connective tissue aberrations create functional changes in the nature of nuclear DNA expression, and have the potential to change the future of genetic expression of cells affected by scars (Ingber, 1993b; Ingber, 1993).

Visualizing Scars

Jean-Claude Guimberteau concurs with Ingber's research linking the properties of connective tissue tension to genetic expression within the cell,: "Maybe this multi-fibrillar [connective tissue] network has the capacity to influence the cellular genomic process" (Guimberteau, 2016). By using endoscopic film technology during live surgeries, Guimberteau has made a valuable contribution to the visualization of both fascia and scar tissue. In his groundbreaking images of living human fascia, Guimberteau has observed that there is uncertainty, or a lack of predictability in the movement of the tiny collagenous members of connective tissue's tensegrity structures, right beneath the

skin. Guimberteau's observations are in alignment with Levin's practical experience in orthopedics, which led Levin to question conventional laws of biomechanics (Guimberteau & Armstrong, 2015; McHugh, 2013).

In his popular online webinar, Guimberteau suggests that due to uncertainty, the conventional laws of neither biomechanics nor Newtonian physics successfully predict the behavior of fascia (Guimberteau, 2016). Guimberteau notes, along with Hameroff, Mammoto, and Ingber, that intracellular connectivity goes from the ECM to the very heart of every chromosome within each cell's nucleus (Guimberteau, 2016; Hameroff, 1998; Mammoto & Ingber, 2010). Each of these scientists submit that the substructural microtubular elements integrating cells, fascia, and the ECM are, in their essence, materials governed by the emerging laws of quantum mechanics (Guimberteau, 2016; Hameroff, 1998; Ingber, 2010; Mammoto & Ingber, 2010). Mammoto and Ingber write that the genetic outcome of this connectivity is determined in real time by deformations in local fascia, which pulls on contiguous cytoskeletal substructures. As the effects of this deformation cannot be predicted, the way scar tissue affects cellular function has yet to be formally characterized (Mammoto & Ingber, 2010).

Referring to the mid-20th-century contributions of James Cyriax to orthopedic medicine, Medici states that once a scar or adhesion is identified, it is simple work to apply manual cross-fiber techniques to adherent tissues to change their viscosity, elasticity, and structure (Cyriax, 1982, 1985; Medici, 2016c). Important new research, published by Spanish research team Martinez Rodriguez and Galan del Rio in 2013, supports Medici's enthusiasm for the abundant publications of Cyriax (Rodríguez & del Río, 2013). These two researchers conducted their study, "Mechanistic Basis of Manual

Therapy in Myofascial Injuries: Sonoelastographic Evolution Control" on athletes in Spain, using real time sonoelastography (RTSE), a specialized kind of ultrasound, to visually map the effects of manual therapy, measuring the changes in their subjects' connective tissue density before and after therapy was applied (Rodríguez & del Río, 2013).

This paper presents sonoelastography images of injured tissue before and after the application of manual therapy, recording the relative elasticity of these tissues as therapy progresses. The use of RTSE is groundbreaking because the use of imagery could finally "directly reveal the physical property of [connective] tissue, making it possible to determine the change of tissue hardness caused by pathology [scar tissue]" (Rodríguez & del Río, 2013, p. 225). In their study, Martinez Rodriguez and Galan del Rio devised a specific manual therapy protocol "that attempts to reverse the matrix state from high to low tension, with controlled mechanical stimuli through the combined use of [the manual techniques of] torsion, shear, traction, axial and compressive vectors on scar tissue" (p. 4).

To understand whether, or how, manual therapy affects smooth muscle cellular response and the potential for increasing elasticity in scar tissue, a baseline had to be established. To get a baseline, Martinez Rodriguez and Galan del Rio measured the local fascial pre-tension in injured, scarred myofascial (muscular and fascial) structures (Rodríguez & del Río, 2013). Next, the team was able to quantify what they called a mechanical dose of manual soft tissue therapy applied to the tightened, scarred tissue of their research subject. Finally, they measured the effects of manual therapy that were applied to the scarred myofascial tissue. This was recorded as a series of images,

visualized in real time, as the tissue reacted to various techniques and vectors of therapeutic force as they were applied.

The outcome of Martınez Rodrıguez and Galan del Rio's research suggests that "fascial stiffness by hypertrophic scars, [is] a relevant etiological factor of muscle injury and relapse" (Rodríguez & del Río, 2013, p. 225). Most importantly, this study demonstrated that manual therapy on scar tissue produces visible, measurable change. Their images show pictures of massage therapy working to increase the elasticity of scars: "[t]his information is analyzed by the equipment software, which then provides a color-coded elasticity map containing objective and storable information" (p. 226).

Subsequent research contributed by a different team of Spanish physical therapists supports that changes in the elasticity and thickness of scar tissue may be visualized using ultrasound and sonoelastography (Comesaña et al., 2017). This team of researchers pursued the application of Myofascial Induction Therapy for treatment of painful C-section scars that were up to 18 months old. In their pilot study, the team found that:

> Participants no longer have to suffer the specific problems arising from the scar, that a normal lumbar flexion function is obtained and that there are structural changes at both the deep and superficial layers of the scar which could explain the clinical improvement. (p. 203)

Biophysics, Fascia, and Somatic Recall

Biophysicist Mae-Wan Ho wrote *The Rainbow and the Worm* in 1992 to reconcile theoretical laws of physics with the reality of biological complexity (Ho, 1993). In her book, she explains that there are two fundamental communication systems in the body: the more watery connective tissue matrix, and the electrically conductive nervous system.

She states that the nervous system is a relative newcomer in terms of evolutionary history. Ho and others suggest that another, much older communication system held within connective tissue, predates the nervous system by many millions of years (Ho, 1993; Ho & Knight, 1998; Hunt, 2013).

Ho provides rigorous support for the idea that fascia is an organ of communication (Ho, 1993). But she goes much further, claiming that body-consciousness may exist quite independently of the nervous system, and is more fundamental. She argues that information spreads throughout the fascial system much faster than the nervous system:

> This body consciousness is the basis of *sentience*, the pre-requisite for conscious experience that involves the participation of the intercommunicating whole of the energy storage domain. *In the limit of the coherence time and coherence volume of energy storage, intercommunication is instantaneous and nonlocal*. (Ho, 1997, para 8)
>
> This liquid crystalline continuum is responsible for the direct current (DC) electrodynamical field, permeating the entire body of all animals, that Becker and others have detected. Becker has further demonstrated that the DC field has a mode of semi-conduction that is much faster than nervous conduction. During a perceptive event, local changes in the DC field can be measured half a second *before* sensory signals arrive in the brain, suggesting that the activities in the brain may be pre-conditioned by the local DC field. (Ho, 1997, para 15)

In her influential work, Ho describes the quantum submolecular behavior of the collagen matrix as dynamic under certain conditions. Ho differentiates “brain

consciousness," which she describes as neurologically derived, employing neural pathways, from "body consciousness," which is derived from the ability of collagen to initiate rapid "jump conduction" of protons at subatomic levels. This generates information that is distinct from neural information and is moved rapidly through the connective tissue matrix. Based on the work of R. O. Becker, Ho suggests that collagen's conductive abilities transfer information up to 200 times faster than the nervous system, and prime the brain for incoming neural information (Becker, 1990; Ho, 1997):

> Up to 70% of the proteins in the connective tissues consist of collagens that exhibit constant patterns of alignment, as characteristic of liquid crystals. The liquid crystalline nature of the continuum also enables it to function as a distributed memory store. The proportion of bound versus free water on the surfaces of proteins are known to be altered by conformation changes of the proteins. Proteins undergo a hierarchy of conformational changes on a range of time scales. They can thus be triggered to undergo global conformational changes that will, in turn, alter the structure of bound water. As the bound water forms a global network in association with the collagen, it will have a certain degree of stability, or resistance to change. The corollary is that it will retain tissue memory of previous experiences. The memory may consist partly of dynamic circuits, the sum total of which constituting the DC [direct current electrical] body field. Thus, consciousness is distributed throughout the entire body, brain consciousness being embedded in body consciousness. Brain and body consciousness mutually inform and condition each other. (Ho, 1997, para 15–16)

Ho's ideas about the prescient and sentient qualities of connective tissue have

been cited frequently by fascia researchers over the last several decades (Friesen, Craddock, Kalra, & Tuszynski, 2015; Hammerschlag et al., 2015; Langevin & Yandow, 2002; Oschman, 2003; Tozzi, 2014). One of these researchers is James Oschman, who coined the term *somatic recall*, and in a pair of papers devoted to this subject stated:

> Practitioners who repeatedly have these "somatic recall" experiences with their clients begin to suspect that "memories" of traumatic or other events may be stored in or accessed by the soft tissues of the body. Sometimes the "flashback" is associated with erasure of the memory. When this happens, the emotional "charge" surrounding the memory may disappear. To the extent that our mental lives influence our physical bodies, and vice versa, any therapeutic practice that has an effect on memory can have a profound, dynamic, and multidimensional influence on every attribute of the organism. (Oschman & Oschman, 1995a, para 4–5)

Oschman has made the case that fascia and its properties as described by Ho are the living substrate of the unconscious mind (Oschman & Pressman, 2014). In a paper published in the *International Journal of Transpersonal Studies* titled “An Anatomical, Biochemical, Biophysical and Quantum Basis for the Unconscious Mind,” Oschman and Pressman propose that:

> There are two or more interconnected systems that can sense and respond to the environment and that can also convert repressed emotions into chronic muscle tension or other somatic issues. One connection between sensation and action is the well-established neurophysiological mechanism [nervous system response]

> and another involves semiconduction through the living [connective tissue] matrix. (Oschman & Pressman, 2014, abstract)

Oschman and Pressman postulate that fascia, due to biophysical properties characterized in detail by Ho and Pischinger, provides a template for the storage and retrieval of event memories. Citing the work of Stuart Hameroff from the Center for Consciousness Studies at the University of Arizona, Oschman suggests that there may be parallel processing between the nervous and connective tissue systems in the body:

> The on-off switches known as synapses, which are obviously important components of neural networks, may not be the only place where information is processed and memories are stored. Hameroff stated that the "neuron doctrine" ignores the fact that neurons are living cells. The fact that many neurons are packed with microtubules opens up the possibility that the nervous system itself could have two parallel and distinct mechanisms for the transmission of information: a fast mechanism, involving waves of conformational change in microtubules and other cytoskeletal components [of connective tissue], and a slower, classical mechanism [nervous system impulses]. (Oschman & Pressman, 2014, p. 82)

Oschman cites the work of Ho, Pischinger, and Hameroff as jumping off places for his theories about the mechanics of how memories may be stored in fascia, positing that memory may be stored as an artifact of habitual body usage, including minute adaptations in cytoskeletal mechanics (Oschman & Pressman, 2014). Oschman postulates that the movement and storage of information in connective tissue may happen at speeds far exceeding those of ordinary neural transmission. He suggests that the very speed and

subtlety of the connective tissue information processing system mirrors the prescient and/or immediately accurate qualities often ascribed to the unconscious mind in more conventional descriptions offered by main-stream psychology and trauma studies (Oschman & Pressman, 2014).

In their papers about somatic recall, Oschman and Oschman submit that connective tissue communication travels non-locally as cytoskeletal components "read" coherent wave fronts of information generated during soft tissue manipulation, adding that these waves are influenced by the attention and intention of the therapist (Oschman & Oschman, 1995b). Additionally, the Oschmans propose that tissue memories may be erased as connective tissue elements, including ground substance (the ECM), collagen fibers within the ECM, and microtubules within collagen fibers break up. Mammoto and Ingber suggest that microtubules within the cytoskeleton are inextricably linked together, enhancing communication through every level of cellular structure, from the ECM straight into cellular DNA (Mammoto & Ingber, 2010). It is worth noting that Hameroff and Penrose refer to microtubules as potential independent generators of consciousness (Hameroff, 1998; Hameroff & Penrose, 2014).

Differing Views of Memories Held in Fascia

The early research of James Oschman and his wife Nora characterizes "somatic recall" as episodes of recall of otherwise inaccessible memories, which arise spontaneously during bodywork sessions. They explain that bodyworkers frequently encounter such experiences in their day-to-day sessions (Oschman & Oschman, 1995a, 1995b). In their papers devoted to somatic recall, the Oschmans indicate that in these experiences, recollections arise during manual therapy that allow the client to resolve

formerly unconscious traumatic events stored in his or her fascia. In the introduction to the first of these papers devoted to this phenomenon, Oschman and Oschman write:

> Reports that touching someone can release memory traces and even communicate them to another person are of great interest. . . [W]e have talked to enough practitioners who report similar experiences that we have come to regard somatic recall as a frequently occurring phenomenon. Some massage therapists have these experiences daily. Not only is somatic recall widespread, but we think it is an important clue about unsolved mysteries of learning, memory, consciousness, the ways parts of the body communicate with each other, and the effects of touch. (Oschman & Oschman, 1995a, para 6)

Oschman and Oschman are not the only researchers to suggest that fascia is a substrate capable of holding discrete memories. Italian osteopath Paolo Tozzi wrote an editorial in the *Journal of Bodywork and Movement Therapies* titled "Does Fascia Hold Memories?" His piece includes extensive documentation of many interpretations of how memory might be held in the fascia (Tozzi, 2014). In this editorial, Tozzi mirrors the Oschmans' ideas when he proposes that Sheldrake's theory of morphic fields and Pibram's holographic model of brain function may contribute to the way memory encodes into and onto the living substrate of fascia (Oschman & Oschman, 1995b; Pribram, 1977; Sheldrake, 1988; Tozzi, 2014).

Tozzi writes that biomechanical loading (or posture) is a way that collagen formation may encode specific memories. Students of Rolf support this notion (Johnson, 1977; Myers, 2014b; Schleip, 2016a; Tozzi, 2014). Collectively, their early writings suggest that emotions become expressed as gestures, which become reflected in postural

habits over time, and, when unacknowledged and unaddressed, manifest as structural restrictions over the long term (Bond, 1999; Johnson, 1977; Schleip et al., 2006). Tozzi frequently cites the work of Langevin, who publishes prolifically about the effects of acupuncture on fascia. Tozzi mentions Langevin's suggestion that biochemically, immune system cells, which are widely distributed throughout the fascial net, may act as a kind of long-term storage for cellular interactions within the ground substance, the gooey extra cellular matrix that supports muscles, organs, nerves, and glands throughout the body (Langevin, 2006). Tozzi quotes a paper by Kim et al. (2011), which describes a contribution made by fascia's ground substance to sentient qualities more typically reserved for descriptions of endocrine or neural activity:

> The extracellular matrix may play a crucial role in sensing, integrating and responding to the "physical and chemical environmental information either by directly connecting with the local adhesion sites or by regulating global cellular processes through growth factor receptor signalling pathways, leading to the integration of both external and internal signals in space and time." (Tozzi, 2014, p. 260)

Tozzi further explains that every chemical and tensional change in the body will be communicated throughout the fascial net, informing the entire organism at a subtle level. He quotes the work of Ho and Knight, indicating that "body consciousness" is connected to, yet distinct from "brain consciousness" (Tozzi, 2014, p. 263). Tozzi also references the work of Oschman and Oschman, stating in his hypothesis that:

> Holographic memory is distributed globally and yet can be accessed and recovered locally. Possibly during bodywork, the interaction of vibrational,

> biomagnetic and bioelectric fields between therapist and client may allow an exchange of information about the history and the present status of the living matrix. [M]anual therapy might affect various forms of memory, producing profound tissue changes from subatomic to global effects. (p. 263)

These are contentious claims within the connective tissue science community. In his published response to Tozzi's editorial, Structural Integrator Thomas Myers states, "the choice of the word 'memory' is unfortunate and misleading" (Myers, 2014b). Myers questions whether fascia makes any contribution to awareness, suggesting that there is insufficient proof of the mechanics, action, or in fact even the presence of engrams (units) of memory within the brain, let alone the fascia.

In response to Tozzi's editorial, Myers characterizes the scientific approach to describing internal states of tissue memory or consciousness as burdened by a distinct lack of evidence: "We have a long way to go before we have any scientific certainty on these vivid but nebulous internal phenomena" (Myers, 2014b). Myers suggests that tissue memory, rather than being an inherent property of the ECM, is chemically modulated by the fluid system of the body.

Myers cites Candace Pert's molecular model, which theorizes that, along with blood, neuropeptides wash over fascia as part of normal fluid circulation (Myers, 2014b; Pert, 1997). Myers concedes that fascia, the body's neurochemical fluids, and the neural net itself may act together to orchestrate what may appear to the practitioner to be memories held by connective tissue. He also describes how his experience as a clinician supports that internalized belief systems can indeed be held in fascia as postural habits:

> The fascial system steps into this process as well: Anyone who has been depressed for some time (the fascial system is the slowest of these three to respond, so it takes some time measured in months and years) will show a posture that is "stuck on the exhale," with the chest depressed, the shoulders both lifted and slumped, the head falling forward. At this point, it has progressed from involving simply a neurological "idea" to being a fluid emotional "feeling" to be set into the fascial system as a form-based "belief" about oneself in the world. (Myers, 2014b, p. 601)

Regardless of whether memories are held by fascia, fluids, or neurons, scar tissue represents the physical history of trauma held by the body. In addition to injury and surgery, a thoroughgoing exploration of the many causes of scar tissue that could affect women's sexuality will be examined in the remainder of the review of literature.

Scars from Childbirth

According to the US Department of Health and Human Services, over 2.6 million women gave birth vaginally in the US in 2012 (Martin, Hamilton, Osterman, Curtin, & Mathews, 2013). A 1999 study found that 85% of all women experienced some kind of pelvic floor trauma as a result of spontaneous vaginal delivery (Albers, Garcia, Renfrew, McCandlish, & Elbourne, 1999). These statistics have not improved; more recent studies of risk factors for perineal trauma in the United Kingdom came to the same conclusion: that 85% of women sustain some kind of pelvic floor injury as a result of vaginal delivery (Smith, Price, Simonite, & Burns, 2013).

Tears to the Pelvic Floor

In a 2005 review of research, Dietz and Wilson concluded that vaginal birth and even the attempt of vaginal birth, could cause damage to the pudendal nerve, pelvic fascia, and levator ani muscles (Dietz & Wilson, 2005). Herrera, Schneiderman, and Perez reported that in their physical therapy practice, tears to the pelvic floor were associated with dyspareunia, fecal and urinary incontinence, higher risk of pelvic floor infection, pelvic adhesions and scar tissue formation (Herrera, Schneiderman, & Perez, 2011). In their landmark study of women's sexual function after childbirth, Signorello's group found that 25% of women reported persistent adverse sexual changes that extended 6 months or more beyond the birth of their child (Signorello et al., 2001).

In a recent practice bulletin, the American College of Obstetricians and Gynecologists (ACOG) describes how tears to the pelvic floor are divided into four categories according to their location and severity (American College of Obstestricians and Gynecologists, 2016b). This bulletin stated that differing standards of definition for birth related injuries have led to under-reporting of their true incidence. They reported that the incidence of severe pelvic floor lacerations varied from 1.1%–3.3%, and as high as 11% of all vaginal births, stating that the higher number was estimated to be closer to true incidence.

There is general agreement in obstetrics research about definitions of pelvic floor trauma resulting from childbirth. Swedish, British, and Australian researchers, and ACOG concur that standard definitions of pelvic floor trauma are: first-degree tears are those that extend through the vaginal mucosa posteriorly into the skin layer of the perineum (American College of Obstestricians and Gynecologists, 2016b; Cioffi et al.,

2010; Fernando, Sultan, Radley, Jones, & Johanson, 2002; Rådestad, Olsson, Nissen, & Rubertsson, 2008). Second-degree tears extend deeper and more posteriorly, intruding into the muscles of the pelvic floor. Third-degree tears extend further posteriorly through the perineum to the front of the external anal sphincter. In their 2016 bulletin, ACOG subdivided the third-degree category into three subcategories: 3a, 3b, and 3c according to the percentage through which the external anal sphincter is torn (American College of Obstestricians and Gynecologists, 2016b; Cioffi et al., 2010; Fernando et al., 2002; Rådestad et al., 2008). Fourth-degree lacerations extend to the back of the posterior anal wall, affecting both the sphincter and the ano-rectal mucosa.

In an examination of statistical evidence, Norwitz and others found that third- and fourth-degree tears are identified and reported at the time of delivery in 0.6%–9% of patients, with real incidence of these injuries like to be significantly higher (Norwitz, 2012). Studying ultrasound parameters, Guzman Rojas and his group suggest that for the majority of women, anal injuries are not identified at time of delivery, supporting Dietz's position in his papers published in 2005 (Dietz & Lanzarone, 2005; Dietz & Wilson, 2005; Guzman Rojas, Shek, Langer, & Dietz, 2013). In third- and fourth-degree tears, strong risk of pelvic organ prolapse, as well as urinary and fecal incontinence resulting from obstetric anal sphincter injuries, has been suggested (Dietz & Lanzarone, 2005; Dietz & Wilson, 2005; Guzman Rojas et al., 2013).

In their 2007 paper, Albers and Borders estimated that at least 41% of women who deliver vaginally, tear vaginally (Albers & Borders, 2007). Physical therapists Herrera, Schneiderman, and Perez specialize in pelvic floor injuries. They state that while perineal tears cause pain for new mothers, they are also linked to "infection, dyspareunia,

urinary stress incontinence, fecal incontinence, anal flatulence, scar tissue, pelvic adhesions, swelling and bruising of the perineum and possible damage to the pudendal nerve (Herrera et al., 2011, para 4).

In dramatic findings from her frequently quoted study, Signorello and her research group found at 3 months postpartum, women who suffered a second-degree perineal tear reported dyspareunia at a rate 80% higher than women without perineal trauma (Signorello et al., 2001). Signorello's group also found that women who suffered third-degree perineal trauma reported a rate of dyspareunia 270% higher than women who delivered over an intact pelvic floor. These statistics have been widely quoted throughout the literature on perineal trauma (Abdool et al., 2009; Goldberg, 2007; Priddis, Dahlen, & Schmied, 2013; Rathfisch et al., 2010; Signorello et al., 2001; Steege & Zolnoun, 2009).

In their population-based study, Gurol-Urganci et al. found that demographic factors, such as women waiting longer to have children, played a part in changes in the prevalence of dyspareunia due to deep perineal tearing. Prevalence of pelvic floor trauma has tripled in the UK in the last decade, and is increasing significantly in the US as well (Albers & Borders, 2007; Gurol-Urganci et al., 2013). Albers and her group found that delivery technique plays a part in reducing the outcome of perineal trauma during vagina births, stating that "technique that is unrushed and controlled may help reduce obstetric trauma in normal, spontaneous vaginal births" (Albers, Sedler, Bedrick, Teaf, & Peralta, 2006, abstract). Herrera's research team identified several specific factors that increase likelihood of pelvic floor trauma and pathological scar tissue (Herrera et al., 2011). These include forceps delivery and large babies (over 8.5 lbs). Shoulder dystocia (delayed

delivery of the baby's anterior shoulder after the head has been birthed, due to the infant's shoulder getting stuck on the maternal pubic bone), and Valsalva pushing (the mother holding her breath and bearing down while pushing) were also acknowledged as risk factors for perineal trauma.

When pelvic floor or vaginal tears occur, the attending physician or midwife will often close the area with stitches. A 2002 *Lancet* study quantified pain parameters by comparing different types of stitching, continuous or interrupted (Kettle et al., 2002). However, the entire practice of suturing for perineal tears has been called into question, suggesting that leaving the tissues to heal on their own is less painful (Fleming, Hagen, & Niven, 2003; Gordon et al., 1998; Kindberg, Stehouwer, Hvidman, & Henriksen, 2008; Leeman, Rogers, Greulich, & Albers, 2007). Further research reports no difference in pelvic floor function at 10 to 12 weeks postpartum between sutured and un-sutured women, arguing for fewer perineal repair interventions after childbirth (Kindberg et al., 2008; Leeman et al., 2007). Several studies from Denmark reports that sexual discomfort and pain related to suturing are shown to have a negative effect on the lives of women during the first year postpartum (Kindberg et al., 2008).

Sutures

There is much data about the various properties of suture materials including tensile strength and elasticity. Suturing can be made of braided or monofilament materials, according to Goldstein and his group (Goldstein, Vakili, Franco, Echols, & Chesson, 2007a). Goldstein, a pelvic floor reconstruction surgeon, reports that there is very little investigation of how vaginal tissues respond to these materials (Goldstein, Vakili, Franco, Echols, & Chesson, 2007b).

As mentioned in Chapter 1, Bakkum's research suggests that suturing materials themselves can be causes of infection, inflammation, and active scar tissue (Bakkum et al., 1995). According to Bakkum and his research group, foreign particles from suturing materials become embedded in local tissues, creating differing inflammatory reactions, depending on which suture material was used. Braided materials were found to lead to more proliferation of postsurgical adhesions. Bakkum's group observed adhesions to extend from the sutures themselves into local tissues. They further state that different materials produce differing amounts of inflammation. For example, more pronounced reactions were found using catgut compared to Prolene (Bakkum et al., 1995). According to Australian physiotherapist Alyssa Tait, episiotomy scars can cause painful adhesions after suturing incisions or tears in the pelvic floor (Tait, 2014). From Bakkum's research on suture materials and abdominal adhesions, it can be inferred that birth attendants' choice of suture material affects the spread and consequences of active scar tissue in the pelvic floor.

Goldstein et al. observed that more bacteria adhere to the interstices in braided suture compounds compared to monofilament material in the genital/vaginal environment (Goldstein et al., 2007b). In their 2007 paper, they argue that tight junctions in braided suture material make it difficult for immune system cells such as macrophages to tackle bacteria trapped in these braided filaments. Goldstein and his group demonstrated that this leads to infection, ECM granulation, proliferation of scar tissue, and adhesions. Along with other studies, Goldstein et al. conclude that monofilament synthetic suture materials are found to be more readily absorbed, and are preferable to braided materials, particularly in the vaginal environment (Goldstein et al., 2007b; Gordon et al., 1998).

Perineal pain was evaluated in several studies, and for pain, too, non-braided material is reported to be preferable to the more slowly absorbed braided materials (Gordon et al., 1998; Kindberg et al., 2008; Steege & Zolnoun, 2009).

Signorello and her group state that perineal lacerations affect women's arousal and sexual lives (Signorello et al., 2001). It is necessary to examine female sexual anatomy and the mechanics of female sexual arousal to understand the details of how this occurs. According to female arousal and anatomy expert Sheri Winston, delicate capillary beds create engorgement during sexual arousal (Winston, 2010). These capillary beds are located where suturing is common after perineal trauma during childbirth (Signorello et al., 2001; Bakkum et al., 1995; Winston, 2010). Bakkum states that suturing causes adhesions to occur where sutures are located (Bakkum et al., 1995). According to Winston, engorgement of the clitoris and surrounding erectile tissue capillaries is necessary for full arousal to occur. Although this review of literature found no explicit articles documenting this specifically, given the work of Bakkum, Signorello, and Goldstein showing that sutures contribute to scars, it seems likely that these scars would interrupt normal sexual function.

Clitoral anatomist Helen O'Connell states that there is close approximation (distance) between the capillary beds of the clitoris and the vestibular bulbs on either side of the vaginal opening and defines the vestibular bulbs as part of the clitoris. O'Connell further states that the urethra and vagina are "intimately related structures" (O'Connell, Sanjeevan, & Hutson, 2005, abstract). Physical therapist Melinda Fontaine states that scar tissue damages capillary beds, muscles, and nerves in the pelvic floor. When these tissues

are damaged and their engorgement function is lost, arousal is affected, and sexual pain will ensue (Fontaine, 2012).

In his book, *Everything You Always Wanted to Know About Sex but Were Afraid to Ask*, author David Reuben, MD characterizes a "husband's knot" as a "procedure most husbands appreciate," and as an "aphrodisiacal plastic surgery done on women" (Reuben, 1999, p. 89). One Turkish study finds that women frequently report pain when attempting intercourse after a "husband's knot" of tight suturing creates additional tightening at the vaginal opening (İnan et al., 2015). Alarmingly, in a 2008 *Psychology Today* article about mode of childbirth as it relates to postpartum sexuality, author Matthew Hutson notes that there is a 100% rate of episiotomy in Turkey (with, according to Inan et al., some percentage of husband's knots accompanying them) (Hutson, 2008; İnan et al., 2015). According to Belgian surgeon Julie Dobbeleir, MD, the procedure of adding extra tightening to a perineal repair has been practiced since the mid-1950s. She describes how midwives and gynecologists use extra stitches to tighten the vaginal opening during an episiotomy or when repairing a perineal tear (Dobbeleir, Van Landuyt, & Monstrey, 2011). In a *Huffington Post* article, Dr. Robert Barbieri, chair of obstetrics at Harvard's Brigham and Women's Hospital, is quoted as saying:

> What they thought is that if they did a routine episiotomy, they'd have a chance to repair it [the perineum] and that during the repair, they could actually create a better perineum than if they hadn't done it. The idea [was] that we could "tighten things up." (Pearson, 2012, para 13)

Differing kinds and quantities of scar tissue form in addition to an already over-tight vaginal opening after this "repair," as described above by Barbieri, Bakkum, Tait,

and Fontaine, depending on the choice of suture materials. Bakkum, Tait, and Fontaine each suggest that any scar tissue present from previous births, or inflammation and scars caused by the suture materials themselves, have the potential to create scars that exacerbate pain during intercourse (Bakkum et al., 1995; Fontaine, 2012; Tait, 2014). In their exhaustive article about causes of dyspareunia, Steege and Zolnoun conclude that after a sutured rectal sphincter repair, 7 to 10% of women still have pain with intercourse 1 year after delivery (Steege & Zolnoun, 2009).

Eight Common Birth Practices that Lead to Scars

In addition to perineal tears and their repair, common birth practices including labor induction, epidural anesthesia, instrumental delivery, directed pushing and Valsalva maneuver, birth position, fundal pressure, C-section, and episiotomy all have been implicated for their contribution to women's sexual pain after childbirth (Cambic & Wong, 2010; Ejegård, Ryding, & Sjögren, 2008; Goldberg, 2007; Rathfisch et al., 2010; Steege & Zolnoun, 2009). The literature submits that each of these interventions is likely to increase perineal trauma to the maternal pelvic floor. These practices would therefore also promote formation of scar tissue during the wound healing process at the perineum. According to Hardy, whether scar tissue resolves successfully or induces pain is a matter of the amount of inflammation present in perineal tissue as it undergoes the phases of wound healing (Hardy, 1989). Each of these interventions will be considered and examined below.

Labor induction. According to the American College of Obstetrics and Gynecology (ACOG), a full-term pregnancy ranges between 39 weeks and 40 weeks, 6 days (American College of Obstestricians and Gynecologists, 2013). ACOG describes

how when pregnancy has gone beyond term (past 42 weeks) labor induction is commonly used to initiate uterine contractions. According to Caughy, writing for ACOG, and American midwife Ina May Gaskin, induction of labor is accomplished by intravenous use of Pitocin, a synthetic form of oxytocin, and may also include the use of pharmaceutical prostaglandins (Caughy, 2014; Gaskin, 2003). The use of induction to bring on labor may be elective or suggested by a nurse, midwife, or physician, and typically causes very strong contractions. The intensity of these contractions creates the need for epidural anesthesia, which many researchers suggest contributes to perineal injury, its repair, and the inevitable consequence of scar tissue formation (Ejegård et al., 2008; Gaskin, 2003; Robinson, Norwitz, Cohen, McElrath, & Lieberman, 1999).

In their 2013 committee opinion paper, ACOG stated that prior to 2012, the definition of what was considered a full-term pregnancy was far more liberal than it is today (American College of Obstestricians and Gynecologists, 2013). A 5-week window, from 3 weeks before the expected due date until 2 weeks after the due date was considered "term." Although the American College of Obstetrics and Gynecology has issued new parameters for what is considered to be full term at 39 to 40 weeks, their concern is that women and their health care providers lack a common language to describe when the pregnancy is considered "full term" (American College of Obstestricians and Gynecologists, 2013).

Research published in the journal of the Minnesota Medical Association showed that as many as 24% of women believed that 34 to 36 weeks was considered full term, while 50.8% responded that 37 to 38 weeks was full term. Only 25.2% of respondents understood that full term occurs at 39 to 40 weeks of gestation (Ohnsorg & Schiff, 2010).

This article stated women are uninformed about new definitions of *full term*, and therefore were uninformed about the accurate due dates of their pregnancies. Ohnsorg and Schiff suggest that when this is the case, women are more likely to ask for elective labor induction or be persuaded that induction is appropriate as an option that will reduce their discomfort as pregnancy nears its end. The 2013 ACOG white paper suggests that induction of labor makes the outcome of perineal trauma (and ensuing scar tissue) more likely (American College of Obstestricians and Gynecologists, 2013).

The Centers for Disease Control and Prevention (CDCP) reports that, after growing every year between 1990 and 2010, induced labor declined in 2011 and 2012 (Osterman & Martin, 2014). The CDCP report states that labor inductions more than doubled between 1990 and 2010, along with an average gestational age decline due to increases in both cesarean section and labor induction. In several studies, labor induction was named as a factor associated with increases in both severity and incidence of vaginal tears and perineal trauma (Davis-Floyd, 1994; Dudding, Vaizey, & Kamm, 2008; Gottvall, Allebeck, & Ekeus, 2007; Robinson, Norwitz et al., 1999).

In a review article published in 2011, Lavy et al., stated that the association between labor induction and perineal injury was controversial, and likely to be confounded by other factors, including epidural anesthesia and instrumental delivery (Lavy, Sand, Kaniel, & Hochner-Celnikier, 2012). Although critics suggest that the relationship between labor induction, epidurals and an increased need for C-section is controversial, many birth activists and midwives argue that fetal distress is a common outcome of induced labor and leads to instrumental delivery or emergency cesarean deliveries (Arms, 1994; Davis-Floyd, 1994; Gaskin, 2003; Klein, 2006). Dietz and

Wilson submit that these deliveries require suturing of tears and C-section incisions, which produces significant accompanying scar tissue (Dietz & Wilson, 2005).

Epidural anesthesia. Cambic and Wong document the relationship between labor induction, analgesia requests, and perineal trauma in the *British Journal of Anaesthesia* (Cambic & Wong, 2010). In a Cochrane review, epidural analgesia has been associated with the need for additional interventions in the birthing process, including the use of forceps and vacuum extraction (Anim-Somuah, Smyth, & Howell, 2005). In a study of pelvic floor muscle trauma on women who delivered vaginally, Dietz and Lanzarone found that one third of subjects suffered avulsion (tearing completely through) of certain pelvic floor muscles. Surprisingly, the authors stated that as of 2005, "there have been no imaging studies in the published literature comparing the state of the pelvic floor musculature before and after childbirth" (Dietz & Lanzarone, 2005, p. 707). This lack of study suggests there is little data to define what non-traumatic birth for the maternal pelvic floor might look like. Although these authors found association between avulsion and instrumental delivery, they did not document the relationship between avulsion, induction, and the use of epidural anesthesia.

However, there is much research to support that instrumental birth interventions cause an increased risk of maternal perineal trauma (Cambic & Wong, 2010; Casey et al., 2005; Kudish, Sokol, & Kruger, 2008). Recent reports indicate that as hospital policies have shifted toward reductions in elective labor induction, the incidence of instrumental delivery and the pelvic floor trauma produced by these procedures significantly reduced (Akinsipe, Villalobos, & Ridley, 2012; Ohnsorg & Schiff, 2010). This review of

literature did not find long-term longitudinal studies that showed the impact of perineal injury on sexual function past 1 year postpartum.

Forceps and vacuum extraction. Midwife Lianne Herbruck describes the history of various medical instruments used to expedite delivery (Herbruck, 2008). In a detailed paper about the impact of childbirth on the maternal pelvic floor, she reports that instrumentation includes the use of forceps and vacuum extraction. She explains that forceps are an instrument shaped like a pair of salad tongs and are used to guide the head of the infant out of the birth canal. She documents that instrumental delivery has been used since 1500 BCE and has markedly increased the risk for deep perineal lacerations and pelvic nerve damage.

In another paper about the effects of pregnancy and childbirth on the pelvic floor, the use of forceps has been significantly associated with increased stress urinary incontinence (SUI) due to pelvic floor injury (Goldberg, 2007). Goldberg finds that women have 10 times the risk of SUI at 7 years postpartum when they have a forceps delivery. He describes how the use of forceps and their shanks expands the space in the pelvis by up to 10%, and stretch the perineum, with great potential of damage to both the perineum and anal sphincters. “The average force of forceps against the surrounding pelvic tissues has been estimated at 75psi. Up to 80% of women who undergo forceps delivery will have anal sphincter injuries detectable by transanal ultrasound” (p. 28). Herbruck elucidates that when a woman has epidural anesthesia, she is unlikely to be able to feel the amount of instrumental force applied, thus increasing risk of perineal injury (Herbruck, 2008). Signorello et al. found that rates of dyspareunia at 6 months postpartum indicate a connection between instrumental delivery and painful sexual

function. Women who had instrumental interventions during delivery were 2.5 times more likely to have painful intercourse (Signorello et al., 2001). Turkish researcher Gulay Rathfisch found that not only is dyspareunia after perineal trauma more likely to occur, it is comparatively more painful than dyspareunia in women who give birth over an intact perineum (Rathfisch et al., 2010).

The Mayo Clinic website explains that vacuum extraction employs the use of a soft or rigid cup, attached from a suction device to the crown of the baby's head, to help guide the baby out of the birth canal (Mayo Clinic, 2016). Although vacuum extraction is also associated with trauma to the perineum, a 2007 Cochran review comparing vacuum extraction to forceps delivery found that vacuum extraction was associated with significantly less perineal trauma (Johanson & Menon, 1999). This finding is corroborated by a retrospective observational cohort study stating that when instrumental delivery is necessary, the obstetrician should choose vacuum extraction over forceps due to decreased risk of perineal trauma (Kudish et al., 2008).

Directed pushing and the Valsalva maneuver. Directed pushing employs the use of verbal instruction to tell a laboring woman when to push, and how hard. In their meta-analysis of passive fetal descent versus directed pushing during labor, Brancato, Church, and Stone state that epidural analgesia affects a woman's natural instincts and sensitivities and interferes with her ability to know when or how hard to push during labor. Their paper concluded, "passive descent should be used during birth to safely and effectively increase spontaneous vaginal births, decrease instrument-assisted deliveries, and shorten pushing time" (Brancato, Church, & Stone, 2008, p. 4). Despite published evidence that encourages its replacement with other methods, directed pushing during the

second stage of labor is still reported to be commonly used in hospital settings (Brancato et al., 2008; Osborne, 2010; Prins, Boxem, Lucas, & Hutton, 2011). According to Herbruck, laboring women are frequently directed to concentrate their pushing efforts in synchrony with their contractions once they are fully dilated, whether they feel the urge to push or not (Herbruck, 2008).

A systematic review comparing spontaneous pushing with the Valsalva maneuver characterized Valsalva as: "a woman is instructed to take a deep breath at the beginning of the contraction, to hold her breath and push as long and hard as she can in synchrony with her contractions" (Prins et al., 2011, p. 662). This technique is colloquially termed "purple-faced pushing." Its use increases pressure on the pelvic floor, and has been shown by ample research to lead to increased maternal perineal trauma (Albers et al., 2006; Brancato et al., 2008; Herbruck, 2008; Osborne, 2010; Prins et al., 2011; Sampselle & Hines, 1999).

Brancato, Church, and Stone define directed pushing as the opposite of spontaneous or physiologic pushing. Spontaneous pushing happens as part of a laboring woman's natural instinct to push, sometimes independently of the timing of her contractions (Brancato et al., 2008). Beynon described physiologic pushing as using one's natural inclination to know when and how hard to push during labor in 1957 (Beynon, 1957). More recent studies suggest that women who employ physiologic pushing with an open glottis (back of the throat) have better perineal outcomes (Brancato et al., 2008; DiFranco & Curl, 2014; Flynn, Franiek, Janssen, Hannah, & Klein, 1997). Additional studies show that women who use spontaneous or physiologic pushing have

less perineal trauma, and thus less perineal scar tissue (Beynon, 1957; Flynn et al., 1997; Sampselle & Hines, 1999).

Birth position. Birth positions have been studied at length and found to affect both the outcome of labor and the health of the perineum. Studies on the impact of childbirth on women's perineal health report that often women in hospitals are restricted to giving birth lying supine, semi-reclining on their backs, or, most commonly, in lithotomy position lying on their back with their feet in stirrups (Albers et al., 2006; Herbruck, 2008; Soong & Barnes, 2005). According to pelvic health rehabilitation specialist Amanda Blaz, the enforcement of lithotomy position is for the convenience of attending birth practitioners, in order to place fetal monitoring equipment on the laboring woman. Lithotomy position requires the mother to push without the assistance of gravity, and requires more pushing force than an upright birth position (Blaz, 2011). Researchers find that many women are not offered alternative birth position options, with poor outcomes for perineal integrity (Dekker, 2012; Gupta, Hofmeyr, & Shehmar, 2012). Evidence from many studies clearly indicates that use of alternatives to lithotomy birthing position are less damaging to the pelvic floor, and reportedly reduce the need for episiotomy and suturing (Declercq, Sakala, Corry, & Applebaum, 2007; DiFranco & Curl, 2014; Renfrew, Hannah, Albers, & Floyd, 1998; Soong & Barnes, 2005; Walker et al., 2012). A Cochrane review of birth position during labor argues that although many review studies are critical of lithotomy as a birth position, the practice continues.

> Until such time as the benefits and risks of various delivery positions are estimated with greater certainty, when methodologically stringent data from trials are available, women should be allowed to make choices about the birth positions

in which they might wish to assume for birth of their babies. (Gupta et al., 2012, abstract)

As an example, many studies report side-lying birthing positions have less statistical association with pelvic floor lacerations or other trauma (Albers & Borders, 2007; Herbruck, 2008; Roberts, 2002; Roberts & Hanson, 2007; Soong & Barnes, 2005; Souza, Costa, & Riesco, 2006). The Cochrane review cited above compared upright birth positions such as squatting, standing, or weight on all fours with non-upright birthing positions (lithotomy, semi-reclining, and side lying). Research concluded that there was less chance of instrumental intervention, including forceps, vacuum extraction, and episiotomy, for women who gave birth in upright positions (Gupta et al., 2012).

Fundal pressure. Little literature is available about the use of fundal pressure in the US. According to Habek, Bobić, and Hrgović, fundal pressure is also called the Kristeller maneuver, named after Berlin obstetrician Samuel Kristeller. Habek and his group describe fundal pressure as manual pressure applied to the maternal uterus from outside her body, by pushing down on the abdomen through the anterior abdominal wall onto the uterine fundus (Habek, Vuković Bobić, & Hrgović, 2008). The fundus is the upper portion of the uterus, and according to Habek and his group, fundal pressure, also called fundal expression, is used to facilitate and expedite delivery (Habek et al., 2008).

The Iowa Department of Public Health suggests that the study of fundal pressure in the United States is circumspect, stating that this controversial technique is often under-reported in hospital use due its potential for injury to both mother and child, and fear of litigation (Iowa State Health Department, 2004). Though it is difficult to attain much reliable data about the use of fundal pressure due to medical and legal reasons, in

one survey, 84% of US obstetric providers reported its use (Torentino, 1990). Korean researchers studied another method of fundal pressure, which uses a pressurized inflatable belt while labor is in progress and found it to reduce labor times without complications (Kang et al., 2009).

In private conversation, one midwife reported that fundal pressure is used in virtually every cesarean delivery (S. Shealey, CNM, personal communication, September 4, 2015). There is sufficient data to suggest that perineal injury during vaginal birth is a common outcome when this technique is applied with too much force and speed (Iowa State Health Department, 2004; Matsuo, Shiki, Yamasaki, & Shimoya, 2009; Simpson & Knox, 2001; Torentino, 1990). In one Japanese study, the risk factor for severe perineal lacerations from the use of fundal pressure was evaluated. It found that uterine fundal pressure was an independent factor for increased risk of maternal pelvic floor injury (Matsuo et al., 2009).

The report by the Iowa Department of Public Health suggests this technique is not normally taught in medical schools or nursing programs but seems to be handed down in clinical settings during labor and delivery (Iowa State Health Department, 2004). A 2012 study comparing the use of fundal pressure against controls found that episiotomy, perineal pain, and dyspareunia were significantly higher after the use of fundal pressure (Sartore et al., 2012). “[U]ntimely, uncritical and extensive fetal expression [fundal pressure on the fetus] may entail severe intrapartum complications for both the mother and the child” (Habek et al., 2008, p. 183).

In several studies, it is shown that fundal pressure causes nerve damage to the mother from compression of nerves in the pelvis, and the practice of fundal pressure is

implicated in dyspareunia, due to increased pressure referred to the perineum (Ejegård et al., 2008; Matsuo et al., 2009; Rathfisch et al., 2010). Other reported effects of fundal pressure include perineal tearing, anal sphincter tears, amniotic fluid embolism, uterine rupture, inverted uterus, hypotension, respiratory distress, abdominal bruising, rib fracture, and ruptured liver to the mother, as well as brachial plexus injury and brain damage to the infant (Iowa State Health Department, 2004; Matsuo et al., 2009; Verheijen, Raven, & Hofmeyr, 2009). This literature review could find no documentation about the outcome of scar tissue caused by these complications.

The benefits of fundal pressure are defended by Habek and his group as providing a breakthrough at the end of second-stage labor, when the mother may be exhausted from pushing, and lack stamina to complete delivery, and that "a very critical approach should be exercised on choosing this maneuver, which should be reserved for the rare and strictly indicated cases" (Habek et al., 2008). The Iowa Department of Public Health has reported that injuries resulting from the use of fundal pressure go unreported due to medical liability concerns. According to critics of this technique, measurable benefits of this procedure have not been reliably confirmed by medical evidence, and its use continues to be questioned (Berghella, Baxter, & Chauhan, 2008; Merhi & Awonuga, 2005; Sartore et al., 2012).

Episiotomy. A Cochrane review article defines episiotomy as a surgical procedure using scissors or a scalpel to make an incision into perineal tissue, to increase vaginal size, in order to facilitate childbirth (Carroli & Mignini, 2009). Many researchers agree that women are waiting until later to give birth, which increases the statistical risk for perineal and anal injury. Dietz and Wilson describe the proported purpose of this

procedure is to protect both the fetal head and maternal pelvic floor (Dietz & Wilson, 2005; Hartmann et al., 2005). Recent research suggests that rather than improving maternal outcomes during childbirth, episiotomy increases the risk of pelvic floor dysfunction (Barbieri, 2012; Carroli & Mignini, 2009; Ejegård et al., 2008; Klein et al., 1994).

Due to a change in medical research toward evidence-based practices, obstetrics has changed in favor of fewer episiotomies (Albers et al., 1999; Albers et al., 2006; Dietz & Wilson, 2005). Although episiotomy has been performed less frequently in recent years, it is still used routinely in some hospitals, and may be considerably underreported. Episiotomy rates are reported to be as high as 80–90% in some parts of the world (Ejegård et al., 2008).

In a critical review of the practice, Jakobi reports that episiotomy was used initially based on theory rather than evidence. He states that changing opinions about birth during the 20th century characterized birth as pathological, rather than as a natural process "believed to necessitate prophylactic intervention to prevent fetal and maternal damage" (Jakobi, 2003, p. 581). A World Health Organization comparison of routine versus restrictive use of episiotomy reported that episiotomy was once thought to reduce damage to the perineum, but it has not been proven to reduce perineal damage or actual perineal pain using most pain measures (Liljestrand, 2003).

Medical and midwifery research describe two kinds of episiotomy, midline and mediolateral (Barbieri, 2012). Barbieri describes median or midline episiotomy as an incision though the midline of the perineum, which follows the line a perineal tear would make through middle of the pelvic floor. Mediolateral incisions are described as angled

posteriorly away from the midline at a 45-degree angle from the perineum toward the ischial tuberosity or sitting bone.

Although there is some research devoted to describing the differences in maternal outcomes between midline vs. mediolateral episiotomies, most of the research compares unrestricted use of these procedures with restricted use of the procedure (Barbieri, 2012; Labrecque et al., 1997; Lappen & Gossett, 2010; Renfrew et al., 1998). Hartmann et al. submit there is limited research comparing midline versus mediolateral incisions (Hartmann et al., 2005), and a 2009 Cochrane review found that "[t]he relative effects of midline compared with mediolateral episiotomy are unclear" (Carroli & Mignini, 2009, abstract). However, in another study, 14.8% of women who got midline incisions suffered perineal tears compared to 7% who got a mediolateral incision (Sooklim et al., 2007).

In a systematic review of the literature, it was reported that midline episiotomy is used more frequently in the US, while mediolateral (angled) incisions are favored in Latin America and Europe (Renfrew et al., 1998). According to a 1994 study, deep tears to the posterior perineum are more common in women who have undergone midline episiotomies, compared with women who gave birth over an intact perineum, or who sustained vaginal tears. In this study, sexual function was weakest for women who received an episiotomy (Klein et al., 1994). Many more studies report that midline episiotomy is consistently associated with a sharply elevated risk for third- and fourth-degree perineal lacerations in women who are giving birth for the first time (Goldberg, 2007; Gurol-Urganci et al., 2013; Klein et al., 1994; Labrecque et al., 1997; Repke, 2003; Zafran & Salim, 2012).

There is compelling evidence linking the use of midline incisions to third- and fourth-degree tears of the perineum (Lappen & Gossett, 2010; Renfrew et al., 1998; Shiono, Klebanof, & Carey, 1990). Because of its association with third- and fourth-degree tears, episiotomy also has a strong link to anal sphincter dysfunction and fecal incontinence (Albers & Borders, 2007; American College of Obstestricians and Gynecologists, 2016a; Carroli & Mignini, 2009; Ejegård et al., 2008; Liljestrand, 2003; Repke, 2003). Because of associated perineal trauma and anal sphincter injury, strong arguments have been made for the abandonment of midline episiotomy in favor of mediolateral incisions (Barbieri, 2012; Signorello et al., 2001).

Research findings that midline episiotomy is associated with external anal sphincter (EAS) injury have prompted a thorough re-evaluation of midline episiotomy as a surgical technique (Barbieri, 2012; Goldberg, 2007; Klein et al., 1994; Labrecque et al., 1997; Repke, 2003). Obstetric anal sphincter injuries (OASIS) are suggested as much more common than previously thought, and are substantially underreported (Gurol-Urganci et al., 2013). These injuries are now traceable through transperineal four-dimensional ultrasound, and studies have found that "the great majority of women with EAS [external anal sphincter] damage on ultrasound (87.0%) had not been diagnosed as having EAS tears in the delivery suite" (Guzman Rojas et al., 2013, p. 464). The authors of this study and others express concern that undiagnosed OASIS require increased attention from birth care providers (Andrews, Sultan, Thakar, & Jones, 2006; Guzman Rojas et al., 2013; Roos, Thakar, & Sultan, 2010). They state concern that without knowing an injury has occurred, there can be no treatment to repair it.

Understandably, reports are common that women are self-conscious about increased flatulence and fecal incontinence following EAS, and it is suggested that the true prevalence of EAS injury is grossly underestimated (Burnett et al., 1991). This review of literature makes clear that injury to the anal sphincters resulting from childbirth and labor interventions, including episiotomy, play a role in later fecal incontinence. As an independent factor after EAS, the role of scar tissue has not been well examined.

In addition to fecal dysfunction and anal sphincter injury, abundant research finds episiotomy has been particularly associated with increased levels of dyspareunia, perineal pain, and sexual dysfunction (American College of Obstestricians and Gynecologists, 2016a; Barrett et al., 2000; Beckmann & Garrett, 2006; Ejegård et al., 2008; Signorello et al., 2001; Souza et al., 2006; Steege & Zolnoun, 2009). According to a long-term follow-up study about sexuality after delivery with episiotomy, "there is no clearly defined evidence for its efficacy, particularly in routine use, because of failure to prevent perineal damage" (Ejegård et al., 2008, p. 1). At 3 months postpartum, longer healing periods, higher rates of infection, and increased dyspareunia were found in women with episiotomy compared to women who delivered over an intact perineum (Larsson, Platz-Christensen, Bergman, & Wallstersson, 1991). Another study found painful intercourse from vaginal dryness was present up to 2 years after episiotomy (Ejegård et al., 2008).

There is little recognition of scar tissue (pathological or otherwise) resulting from episiotomy, tearing, or other trauma to the pelvic floor. Although there are dozens of studies, review articles, and position papers about the use, type, and changing prevalence of episiotomy, there is rarely any mention that scar tissue is inevitable as an outcome of this procedure. However, a National Health Service website from the United Kingdom

includes a brief paragraph mentioning that scar tissue could be one outcome of episiotomy:

> In a few women, excessive, raised or itchy scar tissue forms around the place where a tear happened or where an episiotomy was performed. Scar tissue doesn't stretch, so you may need an episiotomy again if you have excessive scar tissue and you want another baby. (UK National Health Service, 2017, para 33)

Cesarean section. Cesarean section is defined by ACOG as a procedure performed by making an incision through the abdominal and uterine walls to deliver an infant. C-section delivery can be elective or caused by emergency conditions that endanger the life of the baby or mother, during or prior to labor (American College of Obstetricians and Gynecologists, 2015). According to Joy and Contag, cesarean section is one kind of laparotomy, using an abdominal incision, and it is also classified as a hysterotomy, a uterine incision (Saint Louis & Isaacs, 2017).

In 2007, the global prevalence of C-section was 15% overall, with China reporting C-section rates that ranged from 40–46% (Betrán et al., 2007). The use of C-section has continued to rise steadily over the last several decades, and in 2011, almost one out of every three pregnancies in the US was delivered via cesarean section (Caughy, 2014; Waknine, 2013). In certain hospitals in developing countries such as Brazil, Mexico, and Argentina, the prevalence of C-section exceeds rates of 70% (Almeida, Nogueira, Candido dos Reis, & Rosa e Silva, 2002; Scheller, 2014).

Many researchers agree that cesarean delivery is a potent source of scar tissue that can negatively affect the uterus, intestines, bladder, abdominal and back muscles, cervix, and pelvic floor (Barmparas et al., 2010; Barrett et al., 2000; Morales, Gordon, & Bates,

2007; Nisenblat et al., 2006). In many studies, C-section incisions are linked to chronic pelvic pain (Loos, Scheltinga, & Roumen, 2010; Luijendijk et al., 1997; McDonald, Gartland, Small, & Brown, 2015). Scars and adhesions resulting from C-sections are of interest to researchers and are increasingly investigated for their contribution to chronic pelvic pain (Barmparas et al., 2010; Boggs, 2011; Malvasi et al., 2009; Tower & Frishman, 2013).

A study of Brazilian women with chronic pain after cesarean section "revealed pelvic abnormalities in 109 (94%) of the 116 patients with chronic pelvic pain" (Almeida et al., 2002, p. 103). Almeida's study found that anatomical distortions in the pelvis due to scars and adhesions affected bowel and bladder function as well as ligamentous structures. Almeida and his research group concluded that chronic pain in their subjects had been caused by "abnormal healing," a functional definition of active scar tissue (Almeida et al., 2002; Lewit & Olsanska, 2004).

In 2007, the World Health Organization reported estimates that, with a C-section rate of 40% overall, China had the world's highest number of cesarean surgeries (Betrán et al., 2007). Chinese women are reporting problems after C-section, and researchers in Shanghai who compared C-section with vaginal delivery in women with low risk for birth problems found that "[t]he incidence of total complications was 2.2 times higher in the cesarean section group during hospitalization post-partum, compared with the vaginal delivery group" (Wang et al., 2010, abstract). This study also found that the incidence of chronic abdominal pain for women who were 12 months postpartum was significantly higher among women who had cesarean sections.

Scar-related problems associated with C-section deliveries have come under scrutiny in a variety of research papers. One example is scar endometriosis, which is reported as a problem caused by surgical procedures that spread and embed endometrial (intrauterine) tissue from inside the uterus into an incision before it has completed healing (Al-Jabri, 2009; Danielpour, Layke, Durie, & Glickman, 2010; Nominato et al., 2010). Scar endometriosis can be found in scars from C-sections, episiotomies, hysterectomies, appendectomies, and other common abdominal surgeries (Nominato et al., 2010).

Scar endometriosis is defined as embedding endometriomas in the cesarean incision itself, which has now closed, but swells and causes pain during hormonal fluctuations during a woman's menses (Danielpour et al., 2010; Horton, DeZee, Ahnfeldt, & Wagner, 2008; Nominato et al., 2010). Horton and his group describe endometriomas as migrating masses of endometrial tissue that embed in incisions, port entry wounds from laparoscopy, other abdominal scars, and surfaces outside of the uterine environment (Horton et al., 2008). According to researchers who used sonographic and color Doppler techniques to identify and characterize this condition, their prevalence is greater than commonly recognized (Francica et al., 2003). According to physical therapist and pelvic scar tissue specialist Belinda Wurn, endometriomas are themselves a cause of self-propagating scar tissue and adhesions and create a chronic inflammatory environment wherever they embed (Wurn et al., 2009). According to Wurn, these endometrial masses cause severe pain, including dyspareunia, painful periods, back pain, and nausea (Wurn et al., 2011).

Nominato and his group suggest that women are 3.3 times more likely to be found with scar endometriosis after C-section than after episiotomy (Nominato et al., 2010). Additional research submits that abdominal wall endometriosis (AWE) is another kind of scar endometriosis that has been associated with chronic pain. In this condition, endometrial tissue becomes embedded into the abdominal wall, usually in close proximity to a C-section scar (Al-Jabri, 2009; Horton et al., 2008). AWE is described as a "relatively common condition that primarily affects women between 20 and 40 years of age and usually occurs 2 to 5 years after a cesarean section" (Horton et al., 2008, p. 211). Dutch researchers find that C-section scars cause nerve entrapment (Loos et al., 2010; Luijendijk et al., 1997; Recker & Perry, 2011). Surgeon Maarten Loos and his group describe how nerve entrapment can lead to chronic pain after a Pfannenstiel incision or "bikini cut," just above the pubic bone (Loos et al., 2010). Wider incisions are found to increase the likelihood of nerve entrapment by scar tissue (Luijendijk et al., 1997). Several Dutch studies compared pain at 1 and 5 years after Pfannenstiel incision and found that chronic pain from nerve entrapment may not present for months or even years after a C-section (Loos et al., 2010; Luijendijk et al., 1997). This is due to ongoing fascial changes made by active scars, and "[s]urgeons not familiar with this entrapment neuralgia may not recognize the syndrome and judge reported problems to be psychosomatic" (Luijendijk et al., 1997, p. 368).

In China, where the rate of C-section exceeds that of the US, Wang and others describe cesarean scar defects (CSDs) as problems caused in the myometrium (muscular uterine wall), when there is discontinuity in the wound healing process, causing weakness or rupture along the scar from a cesarean section (Wang et al., 2009). According to

several studies, CSDs are associated with chronic pelvic pain, dyspareunia, painful periods, and prolonged menstrual bleeding. Inside the uterus, scar-related complications resulting from C-sections affect placenta placement and conceptus implantation, causing bedridden pregnancies, and sometimes preventing future pregnancies altogether (Nisenblat et al., 2006; Wang et al., 2009). Many papers describe how cesarean scar defects cause the uterus to rupture and create the development of a niche or pocket near the intrauterine surface of a cesarean incision that catches and delays menstrual flow, causing spotting, blood stagnation, and the possibility of infection after a woman's menstrual cycle has finished (Bij de Vaate et al., 2011; Taffel & Placek, 1983; Tower & Frishman, 2013).

Several studies indicate that the number of C-sections a woman has had, along with the position of her uterus, pelvic congestion, and polyps formation throughout scar tissue from cesarean section, each contribute to challenges for future fertility (Nisenblat et al., 2006; Silver et al., 2006; Wang et al., 2009). Research also suggests that problems with placental implantation and placement due to interruptions to intra-uterine integrity from scars may affect both conception and the ability to carry a pregnancy to term.

Although its etiology is controversial, placenta previa is a condition commonly associated with C-section deliveries (Nasreen, 2011; Taffel & Placek, 1983). Due to tissue damage, some of which may be attributed to scar tissue in the uterus, the placenta implants near and grows over the cervix. This necessitates immobilization of the mother during the final months of pregnancy, followed by cesarean delivery (Nasreen, 2011; Nisenblat et al., 2006; Taffel & Placek, 1983).

In an Israeli study about multiple cesarean deliveries, Victoria Nisenblat and her group report that for women who plan large families, multiple cesarean deliveries are becoming more common. Nisenblat et al. state that, in Israel, women are often advised to consider their family size carefully when requesting elective C-section. She suggests that this is because of increased danger of uterine rupture with each successive cesarean delivery (Nisenblat et al., 2006).

In addition to the possibility of scar tissue interrupting uterine integrity, the Wurns and their research group have described how scar tissue infiltrates into and around the Fallopian tubes, contributing to tubal occlusion (Wurn et al., 2008). Occlusion of the tubes causes fertility problems, making it impossible for the egg to travel into the uterus (Nisenblat et al., 2006; Tower & Frishman, 2013; Wurn et al., 2004). Physical therapists describe how as scar tissue from multiple cesarean deliveries accumulates throughout the pelvis, it can wind around the intestines, the broad ligament of the uterus, and the uterine round ligaments as they traverse over the pubic bone to attach into the labia majora (Rosenbaum, 2007; Wurn et al., 2008; Wurn et al., 2004).

Nisenblat et al. point out that, partially due to reports of scar-related complications, women's attempts at vaginal birth after C-section (VBAC) have decreased markedly in recent years, both in the US and in Israel (Nisenblat et al., 2006). Research has also found that women who have a history of multiple cesarean deliveries are less fertile overall because of scar tissue and its effects in Fallopian tubes and the uterus (Nisenblat et al., 2006; Taffel & Placek, 1983; Wang et al., 2009; Wurn et al., 2004). Additionally, scar-related adhesions in the pelvis and abdomen are commonly seen during second C-section procedures, and contribute to bowel, ureter, and urethral

obstruction (Malvasi et al., 2009). Many researchers report that adhesions are associated with dyspareunia, postural aberrations, low back pain, and sexual pain (Barrett et al., 2000; McDonald et al., 2015; Silver et al., 2006).

The literature reports several approaches to abdominal closure after a cesarean procedure is performed (Kapustian et al., 2012; Lyell, Caughey, Hu, & Daniels, 2005; Malvasi et al., 2009). A Cochrane review explains that two peritoneal layers must be incised in order for cesarean section to be performed. Whether to close or not to close these two layers separately from the fascial, fatty, muscular, and skin layers (non-closure of the peritoneum) is matter of substantial controversy and investigation (Bamigboye & Hofmeyr, 2014; Cheong, Bajekal, & Li, 2001; DiLeo, 2011; Kapustian et al., 2012; Lyell et al., 2005; Malvasi et al., 2009; Nagele et al., 1996).

There is additional controversy about whether closing of the peritoneum at the time of operation will increase or decrease the likelihood of adhesion formation (Cheong et al., 2001; Kapustian et al., 2012; Malvasi et al., 2009; Nagele et al., 1996). According to a Cochrane review of 14 trials, non-closure leads to shorter operating times with few apparent negative short-term sequelae (Bamigboye & Hofmeyr, 2014). However, surgeons and others question the long-term impact of peritoneal non-closure, stating concern that this practice may eventuate in complications from adhesion formation (Boggs, 2011; Cheong, Premkumar, Metwally, Peacock, & Li, 2009; Lyell et al., 2005).

In the popular press and on internet forums, many women choose elective C-section for convenience, but others choose cesarean delivery out of concern for their pelvic floor function and sexual relationships after the birth of their child (Buchanan, 2015; Doyle, 2015; Marie, 2015). New evidence suggests that C-section is not protective

against dyspareunia. After C-section, an average of one in four women complains of painful penetration 18 months postpartum (Doyle, 2015).

A quick perusal of American pregnancy information forums yields many examples of women who experience painful sex, much to their surprise, after C-section (Buchanan, 2015; Davies, 2015; Doyle, 2015). Dr. Arun Gosh, an MD quoted in the Daily Telegraph told an interviewer, "Caesarean sections can actually make vaginal intercourse more painful. There's a greater risk of surgical scarring around your uterus, and you're much more vulnerable to infection" (Buchanan, 2015, para 9). According to a recent study in Melbourne, women who delivered by emergency C-section or vacuum extraction were more than twice as likely to experience painful intercourse compared to women who had vaginal deliveries without intervention (McDonald et al., 2015).

Many women who offer comments and questions to online forums mention that since their C-section, their cervix feels battered from penis impact during intercourse (Steady Health, 2016). These women express confusion because this never happened before their cesarean delivery (Babycenter Community, 2007; Steady Health, 2016). According to Wurn and her group, one explanation for this seeming conundrum is that after cesarean section, scar tissue causes the cervix to fixate to connective tissue structures located at the back of the vaginal canal (Wurn et al., 2009). In their book, *Miracle Moms, Better Sex, Less Pain*, the Wurns (2009) describe in detail that minute adhesions attach the cervix to adjacent cardinal ligaments and vaginal tissues.

Award winning sexual arousal educator Sheri Winston points out that a healthy cervix should move, along with the uterus, tenting upward and out of the way of incoming penetrating bodies (fingers, sex toys, and penises) during moments of intense

arousal (Winston, 2010). As scar tissue from a C-section spreads down the front face of the uterus, it fixates the cervix to connective tissue and/or the vaginal walls, making both cervix and uterus vulnerable to cramping from unwanted cervical contact during intercourse (Medici, 2011a; Wurn et al., 2009).

Scars from Surgery and Radiation Therapy

The general association between effects of post-surgical adhesions and disruption in health and normal physiologic tissue function has been well studied (Bove & Chapelle, 2012; Diamond & Freeman, 2001; Ellis et al., 1999; Lower et al., 2004; Parker et al., 2005). However, researchers comment that specific effects of cumulative surgical procedures, and the scars they produce, on sexual function has not been well examined or documented (Barrett et al., 2000; Rosenbaum & Owens, 2008; Signorello et al., 2001). This review of literature will attempt to clarify the links of causation between scars as surgical outcomes and sexual function. Surgery necessitates the initiation of the wound repair process, and literature describing the relationship between surgical procedures, pelvic floor scars, and painful sex will be examined in this section.

In a clinical review, Bayat, McGrouther, & Ferguson state that scar tissue is an inevitable outcome of surgery (Bayat, McGrouther, & Ferguson, 2003). Despite numerous studies linking surgery, scars, and adhesions to pain, "treatment of scar pain has received relatively little notice in the gynecologic literature" (Steege & Zolnoun, 2009, p. 1133). Whether adhesions are spontaneous or proliferate as a result of surgery, the linkage of surgical scars to adhesions in and around the abdominal and pelvic viscera is well documented (Ellis et al., 1999; Lower et al., 2004; Rice et al., 2013; Steege & Zolnoun, 2009).

As previously stated, the SCAR studies documented the results of abdominal adhesions resulting from prior surgeries, frequently found upon dissection or during surgical diagnostic procedures, which were linked to post-operative problems and multiple hospital readmissions (Lower et al., 2004; Menzies & Ellis, 1990; Parker et al., 2005). Concurrent as well as more recent studies support these findings (Hedley, 2012; Liakakos et al., 2001; Maciver, McCall, & Shapiro, 2011). According to Diamond and Freeman, and as reviewed in Definitions, surgical incisions necessarily initiate an inflammatory cascade as part of wound healing (Diamond & Freeman, 2001). Many other researchers describe how, when inflammation is prolonged or chronic, surgical wound healing will result in a progressive adhesion of fasciae between viscera in the abdomen, and into the pelvic bowl and pelvic floor (Diamond & Freeman, 2001; Hedley, 2012; Liakakos et al., 2001; Steege & Zolnoun, 2009).

Diagnostic Procedures: Laparoscopy

According to ACOG, laparoscopy is a closed abdomen procedure where gaseous insufflation is used to pump gas into the abdominal cavity so that a surgical team can use internal cameras to visualize hand-held or robotic surgical instruments (American College of Obstetricians and Gynecologists, 2015). In a longitudinal study of adhesion-related hospital readmissions, Lower et al. describe how laparoscopic investigation is the most commonly used procedure to determine the presence of endometriosis and abdominal adhesions, and also to perform adhesiolysis (surgical adhesion removal) (Lower et al., 2004). Other studies state that laparoscopy is becoming more common for other gynecologic procedures, including hysterectomy, oophorectomy (ovarian removal),

and removal of ovarian cysts (Lower et al., 2004; Luijendijk et al., 1997; Lyell et al., 2005).

The literature about the prevalence of adhesion re-formation after laparoscopy varies widely, with adhesion recurrence reports ranging broadly from 12% to 97% of patients (Arung et al., 2011; Diamond et al., 1987; Lower et al., 2004; Parker et al., 2005). According to Binda, as well as in research conducted by Arung and his group, the prevalence of adhesion re-formation is dependent on the kind of gas used, the pressure of the gas, and the duration of the procedure (Arung et al., 2011; Binda, 2008). Complications from laparoscopy often go unnoticed due to the internal nature of this procedure, but DeWilde and Trew (2007) state that re-adhesion formation resulting from laparoscopy is estimated to be between 70–100%.

Overlooking complications during laparoscopy was one of the major concerns stated in a French study of over 29,000 patients (Chapron et al., 1998). This study showed that the overall complication rate was 4.64 per 1000 patients, and that one in four complications occurring during laparoscopic procedures, went unnoticed during the procedure itself. These complications were only recognized later, and included injuries to the bowel, bladder, vasculature, and abdominal wall.

The SCAR studies were undertaken in Scotland between 1990 and 2005, to determine the rate of hospital re-admissions due to adhesions. The Surgical and Clinical Adhesions Research (SCAR) group undertook this famous research. These studies were important as they quantified the problem of adhesions in a stable population over the course of 10 or more years. There were three separate studies, and many of the same researchers worked in each research group. Each successive study sought to clarify and

quantify the “burden that adhesions pose to patients, surgeons and health services” according to a succinct retrospective summary of this work by DeWilde and Trew, (2007, p. 162).

In the second SCAR study, Lower et al. found that the most common reason for non-operative hospital re-admissions was “unspecified pain” related to adhesion formation (Lower et al., 2004). Importantly, Lower’s group also found that although laparoscopy was reported to reduce healing time, operative time, and surgical trauma, laparoscopy was not statistically shown to reduce the incidence of adhesions overall, over time. In earlier SCAR studies, it was originally postulated that laparoscopy, an apparently less invasive style of surgery, would cause fewer adhesions than laparotomy (open abdominal surgery), particularly in the abdomen (Ellis et al., 1999). However, according to DeWilde and Trew, since laparoscopy still cuts through tissue, an inflammatory cascade of wound healing still occurs, complete with formation of scar tissue (DeWilde & Trew, 2007).

Both wound healing and scar tissue research indicate that if a patient has a pre-existing chronic inflammatory condition such as endometriosis or other subclinical infection, such as undiagnosed chlamydia or pelvic inflammatory disease (PID), inflammation from the infection contributes to intra-abdominal scar formation (Haggerty et al., 2010; Porpora & Gomel, 1997; Wurn et al., 2009). Inovay et al. found that when infection was present at the site where laparoscopy is performed, scarring and adhesion propagation contributed to problems with uterine wall integrity (Inovay et al., 1999). Whether open or closed surgery is performed in the abdomen, when infection is present, literature suggests that active scar tissue will propagate as a result of unchecked

inflammation (Corona et al., 2011; Lewit & Olsanska, 2004; Morris, 1995; Parker et al., 2005; Wurn et al., 2009). Research across a wide variety of disciplines agrees that this affects sexuality, fertility, urinary function, and digestion (Campbell-McBride, 2009; Kaufman, 2001; Rice et al., 2013; Wurn et al., 2011).

Fibroids and Myomectomy

According to UCLA researcher William Parker, myomas, or uterine fibroids, are benign tumors. They have a composition like a keloid scar, and their etiology is still not completely understood (Parker, 2007). Research shows them to be quite common, with an incidence ranging from 40–77% depending on age and ethnicity (Cramer & Patel, 1990; Parker, 2007). Uterine fibroids have been described as one cause of painful intercourse and infertility (Ferrero, Ragni, & Remorgida, 2008; Parker, 2007; Wurn et al., 2009). Fibroids are often discovered during a manual pelvic examination, and confirmed via ultrasound (Leone et al., 2010).

Evans and Busnell define a myomectomy as a surgical procedure used to remove uterine growths or fibroids, which may be performed as either open or closed abdominal procedures (Evans & Brunsell, 2007). French researchers have described how myomectomy is associated with an increased risk of pelvic and abdominal adhesions (Dubuisson, Fauconnier, Chapron, Kreiker, & Nörgaard, 1998). Other research found myomectomy to be associated with a high degree of adnexal (near the uterus) adhesions, especially after an incision performed on the posterior uterine wall (Liakakos et al., 2001; Tulandi, Murray, & Guralnick, 1993). Adnexal adhesions were found in the areas surrounding the uterus and affect fertility by blocking the Fallopian tubes and interfering with transport of the fertilized egg (DeWilde & Trew, 2007). It had been postulated that

laparoscopic myomectomy would significantly decrease adhesion formation, but more recent research has proven that this is not the case (Dubuisson et al., 1998; Lower et al., 2004).

Parker suggests that location of fibroid tumors affects the frequency of cesarean childbirth outcomes. During pregnancy, fibroids located in the lower part of the uterus lead to increased C-section deliveries when compared to fibroids that present in the upper uterus (Parker, 2007). Assessment to identify location and size of uterine fibroids, and subsequent myomectomy to remove them, is reported to be a common solution to fertility problems (Morris, 1995; Parker, 2007; Tulandi et al., 1993). According to Dubuisson et al., scar tissue from myomectomy puts the uterus at risk, by producing rupture during pregnancy or labor (Dubuisson et al., 1998). Uterine fibroids are also described as a leading cause of hysterectomy (Morris, 1995; Parker, 2007).

Hysterectomy

In 2011, ObGyn.net reported that hysterectomy is the most frequently performed surgical procedure for women, particularly in the US (ObGyn.net, 2011). An article about post-surgical pain syndromes states a prevalence of 600,000 hysterectomies performed annually in the US (Recker & Perry, 2011). Studies about hysterectomy indicate that women in the US are three times more likely to get this procedure than women in the UK, and that 33% of American women over the age of 45 have had this operation (Geller, Burns, & Brailer, 1996; Luoto, Raitanen, Pukkala, & Anttila, 2004). Another study reports that the odds of getting a hysterectomy rise to 40% for a woman over 60 years old (Brown, Sawaya, Thom, & Grady, 2000).

Whether all hysterectomy recommendations are appropriate is questioned repeatedly in medical literature (Broder, Kanouse, Mittman, & Bernstein, 2000; Garry, 2005; Kuppermann et al., 2004; Reiter, Gambone, & Lench, 1992). Hysterectomies are recommended as a solution for problems of heavy uterine bleeding, endometriosis, and fibroid tumors. According to a 1996 article about the variation in practice patterns for hysterectomy, they are sometimes performed for complications due to scars from too many cesarean section deliveries, myomectomies, placental presentation pathologies, genital prolapse, and uterine and ovarian cancer (Geller et al., 1996). However, in other studies, scar tissue from hysterectomy is implicated as a major cause of small bowel obstruction, urinary incontinence, chronic pelvic and low back pain, nerve impingement, and other negative sequelae (Barmparas et al., 2010; Bransborg, Nikolajsen, Kehlet, & Jensen, 2008; Brown et al., 2000; Dellon, 2007; Liakakos et al., 2001; Reiter et al., 1992; Tettambel, 2007; Wilcox et al., 1994).

In an article describing the history of hysterectomy in the *British Journal of Obstetrics and Gynaecology*, hysterectomy may be performed vaginally, abdominally, or by laparoscopic procedure (Garry, 2005). Steege and Zolnoun state that women report dyspareunia as chronic pain in the vaginal apex after total hysterectomy (Steege & Zolnoun, 2009). Other research has found that the complication rate for total abdominal hysterectomy is almost twice as high as that for vaginal hysterectomy, and that persistent postsurgical pain and complications are present for up to 50% of women who undergo abdominal hysterectomy (Dicker et al., 1982; Geller et al., 1996). According to Garry et al., their randomized trial found that laparoscopic hysterectomy has been associated with

an even higher incidence of major postoperative complications than abdominal hysterectomy (Garry et al., 2004).

A *Lancet* article found urinary incontinence (UI) to be a long-term after-effect of hysterectomy, as many of the suspensory ligaments for the placement and support of a healthy, functioning bladder are affected by removal of the uterus (Brown et al., 2000). This article also found that, compared to women who have their uterus, the odds of developing urinary incontinence are 40–60% higher for women who have undergone hysterectomy, and that older women are at greatest risk. In a book chapter about groin pain syndromes, Dellon describes how nerves get cut during hysterectomy, leading to a loss of sensation that contributes to UI. In addition, Dellon explains that chronic groin and pelvic pain may be caused by nerve entrapment in scar tissue (Dellon, 2007). Other contributors to pelvic and sexual pain include "distortion of pelvic structures, adhesions to surrounding structures, abnormal healing, myofascial pain from nerve bundle injury, or neuroma formation" (Recker & Perry, 2011, p. 134). Neuromas are swellings in nerves that result from trauma.

Pelvic Floor Dysfunction, Prolapse, and Prolapse Repair

Prolapse is generally understood to be the descent of pelvic organs from normal anatomical position, and is measured in four stages (Hendrix et al., 2002; Uzoma & Farag, 2009). The International Continence Society's definition of the stages of vaginal prolapse is determined by the relationship of the cervix to the hymenal ring just inside the introitus, and cervical placement compared to total vaginal length (Bump et al., 1996; Nygaard, Bradley, Brandt, & Initiative, 2004). In their Women's Health Initiative study of older women, Nygaard and her group found that first-degree prolapse or greater was

nearly ubiquitous. As 97.7% of these study participants measured positive for this condition, they argued that the proposed National Institutes of Health definition of the first stage of prolapse was clinically irrelevant. Since the prevalence of prolapse in older women was found to be high, Nygaard called for revision of the staging system, so that early prolapse might be better studied (Nygaard et al., 2004).

According to osteopath Susan Hendrix and her research group, organ prolapse is one element of the larger problem of pelvic floor dysfunction (PFD) that includes, but is not limited to**, "**urinary incontinence, voiding dysfunction, symptomatic procidentia [bladder, vaginal or rectal prolapse], post hysterectomy vaginal prolapse, fecal incontinence, sexual dysfunction, and difficulty with defecation" (Hendrix et al., 2002, p. 1160). A review article suggests that about one third of adult women in the US suffer from one or more forms of PFD (Lavy et al., 2012). Prevalence studies have found that in the US, nearly 10% of women undergo surgery for PFD, with 30% of those women needing two or more surgical procedures (Nygaard et al., 2008). However, Nygaard suggests there is a lack of conclusive data about the true prevalence of PDF in the US, and the actual burden to the medical system remains unknown.

Many researchers agree that pregnancy and vaginal delivery are by far the greatest causes of organ prolapse (Dietz & Wilson, 2005; Fonti, Giordano, Cacciatore, Romano, & La Rosa, 2009; Hendrix et al., 2002; Quigley, 2007). Although hysterectomy, pregnancy and delivery have all been shown to cause injuries to the pelvic floor, causation is difficult to determine when symptoms occur months or years after surgery or delivery. Furthermore, each of the circumstances mentioned above will affect pelvic floor function in different ways (Fonti et al., 2009). For example, researchers describe how

during pregnancy, increased intra-abdominal pressure from the growth of the fetus can over-stretch the uterine and pelvic ligaments, pelvic floor muscles, and connective tissues (Hendrix et al., 2002; Uzoma & Farag, 2009). They suggest that overstretching eventually contributes to pelvic floor dysfunction and pelvic organ prolapse.

Physical therapists and other pelvic pain specialists agree that proper pelvic floor tone is critical to pelvic floor function (Pastore & Katzman, 2012; Prendergast & Weiss, 2003; Rosenbaum, 2005; Whelan, 2014). Hysterectomy, tears to the pelvic floor, episiotomy, and C-section have been found to affect the tone of pelvic floor muscles (PFMs) both directly and indirectly (Haugstad et al., 2006). Pelvic floor specialist Janet Hulme wrote that as women age, their PFMs thin and are gradually replaced by fibrotic tissue (Hulme, 2005). Both she and others state that as scars in pelvic floor tissue proliferate, the layers of fascia that are distributed throughout the pelvic floor become more brittle and lose tone, affecting pelvic floor function (Barnes, 2008; Hulme, 2005; Lavy et al., 2012).

When neural messaging to PFMs is disturbed, research finds that pelvic floor muscles may become short and tight, and their fascial sleeves get distorted (FitzGerald & Kotarinos, 2003a, 2003b; Hulme, 2005; Raina et al., 2007). This research reports that proprioception becomes diminished as pelvic floor muscles become restricted due to brittle and stiffened fascial sleeves, and that PFMs lose healthy tone and responsiveness. FitzGerald has published a series of papers showing that without sufficient neural messaging, the tone of the pelvic floor may become too high or locked tight (FitzGerald & Kotarinos, 2003b). Conversely, writings in somatics and on the influence of posture on movement suggest that PFMs and other muscles that are without sufficient neural

stimulation may lose tone and get weak, partially due to loss of use and lack of sensation (Hanna, 1990b; Haugstad et al., 2006; Hulme, 2005; Loupos, 2011).

Not surprisingly, many researchers suggest the ability to control urinary and fecal retention and release has an effect on women's sexual confidence (Albers et al., 1999; Dietz & Wilson, 2005; Fonti et al., 2009; Hendrix et al., 2002; Lavy et al., 2012; Lee, Lee, & McLaughlin, 2008). Overall quality of life is decreased due to these conditions according to Handa et al., as well as sexual function (Handa et al., 2007). Women are reported to be understandably embarrassed to seek treatment for urinary and fecal incontinence, and their sexual lives are often abandoned due to lack of treatment (Lowenstein, Pierce, & Pauls, 2009). As a causative factor, this literature review found that scar tissue by itself remains largely unexamined for its potential to create or influence conditions of prolapse, and fecal and urinary incontinence.

Surgical repair is available to address pelvic floor dysfunction, but research has found that one in three women will have more than one procedure to address PFD and pelvic organ prolapse. The prevalence of prolapse repair surgeries in the US is 338,000 procedures annually (Hendrix et al., 2002). Upon examination during multiple surgeries, sequential surgeries have been found to lead to more adhesions and accumulation of scar tissue (Ellis et al., 1999; Hendrix et al., 2002; Lower et al., 2004; Parker et al., 2005). Surgical repairs to prolapsed organs have been linked to pathological scar tissue propagation, infection, dyspareunia, and other problems with sexual function (Lowenstein et al., 2009). Steege and Zolnoun state that if there was dyspareunia present before attempts at surgical prolapse repair, "dyspareunia present before treatment of pelvic organ prolapse has been dwarfed by concerns regarding new or increased

dyspareunia after pelvic support is surgically corrected" (Steege & Zolnoun, 2009, p. 1132).

Ovarian Surgery and Polycystic Ovarian Syndrome (PCOS)

Scars on the ovaries form and are described as a normal function of ovulation; when ovulation occurs, the egg bursts through the ovarian wall creating a lesion in the ovarian surface (Singer, 2004). The ovaries are described as unique, as they are the only organs in the body that must habitually self-scar and self-repair on a cyclical basis (Dougal, 1934). Research suggests that ovaries may become cystic when certain inflammatory, biochemical and hormonal imbalances are present (Duleba & Dokras, 2012; Kelly et al., 2001).

Polycystic Ovarian Syndrome (PCOS) is characterized is by the inability of ovarian follicles to mature properly, which affects ovulation and fertility (Dougal, 1934). In a British guide to the diagnosis of PCOS, it is characterized as a diagnosis of exclusion (Legro et al., 2013). A diagnosis of exclusion is defined as that diagnosis that is left after all other possibilities have been ruled out (Fred, 2013). In the case of PCOS, the diagnosis is used for a wide variety of conditions, and the criteria may include irregular menstrual cycles, anovulation, hirsutism (overgrowth of body hair), acne, weight gain, hormonal imbalance, and infertility (Diamanti-Kandarakis, 2006; Goodarzi & Azziz, 2006; Hendriks, Ket, Hompes, Homburg, & Lambalk, 2007).

The prevalence of PCOS is reported to range from 5–10% for the general population (Mohlig et al., 2004). Among women with obesity and hyperinsulinemia, it is significantly higher, measuring over 28% in some studies (Álvarez-Blasco, Botella-Carretero, San Millán, & Escobar-Morreale, 2006; González, 2012). Numerous articles

suggest that hyperinsulinemia (high blood sugar) and diabetes type II cause states of chronic inflammation that are associated with PCOS (Balen & Rajkowha, 2003; Duleba & Dokras, 2012; González, 2012).

There is strong evidence to suggest that insulin resistance is intimately associated with PCOS (Dunaif, 1997; Ehrmann, 2002; Galluzzo, Amato, & Giordano, 2008). Insulin resistance has been described as a pathogenic link to PCOS, with published findings that 50–70% of women with the diagnosis of PCOS are also insulin resistant (Diamanti-Kandarakis, 2006; Ehrmann, 2002). Cystic ovaries are found to be sources of local inflammation, and often exist in a grossly inflamed immediate environment, which encourages the formation of adhesions (Duleba & Dokras, 2012; González, 2012; Mercorio et al., 2008). Research has also shown the ovaries to be the most common site for adhesion formation after pelvic reconstructive surgery, due to their close proximity to nearby peritoneal structures (diZerega & Campeau, 2001). There is also evidence that adhesions can grow into the Fallopian tubes causing blockage and fertility problems (Wurn et al., 2008).

Laparoscopic ovarian drilling (LOD) is described by Homburg as one of the solutions for infertility caused by PCOS (Hendriks et al., 2007). Mercorio elaborates that drilling of the ovaries is carried out using small needles to puncture the ovarian wall, and break up cystic tissues (Mercorio et al., 2008). He concludes that the use of LOD stimulates ovulation when the use of fertility drugs is not indicated and adds that LOD has been identified as a source of scar tissue and adhesion formation (Gürgan et al., 1991; Mercorio et al., 2008).

Laparoscopic ovarian drilling and other ovarian surgeries are closely linked to adhesion formation (Kriplani, Manchanda, Agarwal, & Nayar, 2001). The incidence of adhesion formation after LOD ranges between 19 and 82% depending on the study (Gürgan et al., 1991; Mercorio et al., 2008). The Wurns suggest these procedures have the potential to contribute to female sexual pain, due to the presence of adhesions restricting the normal range of mobility and motility of women's reproductive organs (Wurn et al., 2009). Winston describes mobility of the uterus, broad ligament, and ovaries as part of normal female sexual response (Winston, 2010). For a complete explanation of these mechanisms, see the section Scars, Sexual Desire, and Physiology of this Literature Review.

Oncological Surgery and Radiation

More women now survive after cervical and ovarian cancers, and their long-term survival has been facilitated by early detection and effective cancer treatment. Nonetheless, as of 2002, "[n]ew cases of uterine body, cervix, ovary, vagina, vulva, and choriocarcinoma cancers together constituted 942,000 cases, accounting for 18.6% of all incident cancers in women in the world" (Sankaranarayanan & Ferlay, 2006, p. 210). Vaginal cancer has been associated with HPV infection, multiple sexual partners, and prior treatment for anogenital and cervical cancer (Daling et al., 2002).

Radiation therapy has been shown to reduce risk of cancer recurrence, but it exacts a toll on sexual function (Keys et al., 2004; Robinson, Faris, & Scott, 1999; Schover, 2005). Radiation has been shown to cause fibrotic damage to the skin, vulvar, and vaginal mucosa, underlying tissues, and organs (Martin, Lefaix, & Delanian, 2000).

Schover reports that many women experience painful intercourse after radiation therapy (Schover, 2005).

Surgical procedures for debulking (removal of diseased tissue) resulting from reproductive cancers are commonly associated with local adhesion formation, which have been found to be statistically linked to intestinal and urethral obstructions (Schover, 2005). Cancerous proliferation itself has been shown to cause loops of adhesive scar tissue that block the lumen (empty tube) of both the bowel and urethra (Nesbakken, Nygaard, Bull-Njaa, Carlsen, & Eri, 2000). Radiation has been associated with immunoreactivity and the initiation of chronic inflammatory processes, leading to the proliferation of fibrosis (scar tissue) in the connective tissue matrix (Martin et al., 2000).

Scar tissue formation has been identified as restrictive to the flexibility of vaginal tissues and interferes with a woman's natural lubrication capabilities (Wurn et al., 2009). When radiation treatments are combined with surgery, lymphatic drainage is believed to be compromised more frequently than with surgery alone (Deo et al., 2004). According to Winston and the Federation of Feminist Women's Health Clinics, compromise in lymphatic drainage interferes with sexual function by prohibiting drainage of engorged tissues of the female sexual arousal network in the pelvic floor (Federation of Feminist Women's Health Centers, 1991; Winston, 2010).

Muscular function in the pelvic floor is identified as negatively affected when scar tissue inhibits circulation, causing ischemia (Hulme, 2005). Ischemia is described as a lack of blood and oxygen to muscle cells, which also potentiates adhesion formation (Monk, Berman, & Montz, 1994). According to Wurn and her group, ischemia and poor circulation contribute to muscular pain in the pelvic floor, including vaginal pain (Wurn

et al., 2011). Additionally, scar tissue is postulated to cause blockage of blood supply to erectile tissues that should engorge and drive lubrication during sexual arousal (Schover, 2005). Without adequate blood supply and lymphatic drainage, delicate and highly vascularized genital tissues are postulated to have compromised function, with painful intercourse as the result (Winston, 2010).

Scar tissue has been linked to relapse of cancer at surgical sites (Heald, Husband, & Ryall, 1982; Höckel & Dornhöfer, 2005; Höckel, Horn, Hentschel, Höckel, & Naumann, 2003). Höckel and Dornhöfer describe how the unique wound-healing environment in the margins of surgical procedures where cancer has been removed is hypothesized to provoke relapse: "[d]epending on the different phases of the healing process cancer cells may be recruited, replicated, and selected at the site of the surgical wound" (Höckel & Dornhöfer, 2005, p. 2999). Pischinger has made a strong case that scar tissue affects the local chemistry, mobility, and blood flow to postoperative areas. As lymph drainage is blocked by scar tissue, an accumulation of cellular waste products builds up in local tissues (Pischinger, 2007). According to Michael Hockel, Ob/Gyn department chair at Leipzig University, new surgical techniques have been developed in order to remove more connective tissue when a tumor is removed. Even so, his research group has found that "the majority of the pelvic relapses, however, arose at the dissection sites of the radical hysterectomy and appeared to originate from microscopic or occult tumor foci within the endopelvic surgical scars" (Höckel et al., 2003, p. 799).

A lack of validated interventions has been described for sexual rehabilitation after cancer has been identified and treated (Schover, 2005). In her paper on sexuality after cancer, Schover notes that this is a significant problem, and that the role of scar tissue as

a contributor to sexual pain has been noted and published. She also notes that adequate strategies to effect positive change in scar tissue from cancer surgeries and radiation have yet to be recognized by the cancer rehabilitation community.

Taking into account the findings of this review of literature up to this point, it is not difficult to imagine the following scenario: a woman who has had multiple cesarean deliveries accumulates scar tissue that damages her uterus. Her doctor suggests a hysterectomy to solve the problem. Nerve damage during her hysterectomy combined with ligamentous distortions in her pelvic bowl from the ongoing propagation of scar tissue causes her to develop urinary incontinence. She has yet another surgical procedure for sling placement to support her bladder, and then develops scar-related complications from the sling placement, necessitating yet more corrective surgery. With each surgical intervention, scars and adhesions accumulate, contributing to and/or catalyzing the next problem. It is notable that after extensive time and effort, this review of the literature has not found a single article that has looked at active scar tissue itself as a primary causative agent in statistically common scenarios such as the hypothetical situation outlined above.

Biochemistry of Scars: Infections and Inflammation

Research that describes the relationship between infection, inflammation, and scar tissue is abundant. The connection between infections, scar tissue and sexual pain will be outlined in this section of the review of literature. In an article in *Matrix Biology*, Hinz defines inflammation as a primary cause for the proliferation of scar tissue (Hinz, 2015). According the National Institutes of Health and Human Services, infections are related to fibrosis, and many fibrotic diseases and conditions have their origins in chronic infection (Wynn, 2007). Research indicates that scar tissue from infections deters the proper

function of affected areas (Schacker et al., 2002). In one example, scar tissue damaged the production of T-cells by HIV-infected lymphatic tissues, and the immune function of this lymphatic tissue became impaired. In an article describing this process, Schacker and his group noted that scarring reduced the population of two kinds of T-cells in individuals who deferred anti-HIV therapy compared to those who received anti-HIV therapy. Once established, collagen deposition from scarring made it impossible for the architecture of lymphatic tissue to make new T-cells, providing a novel mechanism to explain how HIV contributes to loss of immune function.

The Centers for Disease Control and Prevention (CDCP) describe how infections are acquired in a variety of ways, including sexually transmitted infections (STIs) through contact with an infected partner (CDCP, 2011). Infections also include exogenous pathogenic exposures to viruses, parasites, as well as endogenous conditions like endometriosis, yeast infections and bacterial overgrowth (Lareau & Beigi, 2008; Novy, Eschenbach, & Witkin, 2008). Examples of common genital infections are "herpes simplex virus, *Neisseria; rrhoeae, Staphylococcus aureus*, β-hemolytic streptococci, *Chlamydia trachomatis*, mycoplasmas, *Candida* sp., trichomonads, or *Mycobacterium* sp." (Peckham, Maki, Patterson, & Hafez, 1986, abstract).

Pelvic Inflammatory Disease (PID) and STIs

According to Lareau and Beigi, pelvic inflammatory disease (PID) is a polymicrobial infection usually linked to an STI, which causes inflammation and scarring in the upper reproductive tract (Lareau & Beigi, 2008). STIs are described as having multiple causes, including bacteria, viruses, and protozoa (Schneede, Tenke, & Hofstetter, 2003). Research indicates that the incidence of STIs has increased

dramatically in the US, growing from an estimated 15 million in 1996 to 110 million in 2008 (Cates, 1999; Satterwhite et al., 2013). According to US epidemiologic data, the CDCP has linked the apparent rate of increase in sexually transmitted infections to growth in both the diagnosis and incidence of human papilloma virus (Centers for Disease Control and Prevention, 2016). Research from Harvard medical school's teaching hospital Brigham and Women's, as well the work of others, has shown that PID is caused by many possible infective agents, including human papillomavirus (HPV), chlamydia and gonorrhea, and has its highest incidence in women of reproductive age (Brigham and Women's Hospital, 2015; Centers for Disease Control and Prevention, 2016; Lareau & Beigi, 2008). Lareau & Beigi estimate the annual cost of PID to exceed one billion dollars (Lareau & Beigi, 2008).

Brigham and Women's Hospital reports that pelvic inflammatory disease is strongly associated with chlamydia, a bacterial infection (Brigham and Women's Hospital, 2015). As an STI, chlamydia is considered to be particularly problematic because it is often asymptomatic; according to several sources many women will have multiple episodes of chlamydia throughout their sexually active lives, often without knowing they have it (Haggerty et al., 2010; Schneede et al., 2003; Van Voorhis, Barrett, Sweeney, Kuo, & Patton, 1997). Haggerty reports that chlamydia alone has been associated with up to 20% of female infertility in the US, due to scar tissue blockage of fallopian tubes (Haggerty et al., 2010). In their 2008 paper on treating Fallopian tube occlusion with manual therapy, the Wurns and their group argue that as Fallopian tubes are occluded due to scarring, a fertilized egg may adhere onto the tubal wall, or migrate out of the tube and adhere to its external surface, creating an ectopic pregnancy (Wurn et al., 2008). The Wurn group goes on to describe how,

if caught early, ectopic pregnancies may be treated by injection. However, upon later discovery, they report that ectopic pregnancy must be resolved surgically, either by laparotomy or laparoscopy, either of which will create more scar tissue (Wurn et al., 2008).

The apparent incidence of PID peaked in 1982, with estimates of over 1 million cases diagnosed (Lareau & Beigi, 2008). However, according to Brigham and Women's Hospital, the epidemiology of PID is not well documented, due to the frequency with which it is missed when the patient has no prior history of sexually transmitted disease (Brigham and Women's Hospital, 2015). Steen and Shapiro stated their concern that there is also some evidence that the use of intrauterine devices (IUDs) for birth control contributes to PID (Steen & Shapiro, 2004). Among other sources, they cite a World Health Organization study, which found that if an IUD is inserted in less than aseptic environmental conditions, and there is a cervical infection present, the incidence of PID increased related to IUD insertion procedures. Additional researchers have explained that causes of PID include bacterial infections that come into the vaginal cavity via endogenous gut flora migration or from other sources outside of the vaginal environment (Campbell-McBride, 2010; Lareau & Beigi, 2008; Simms & Stephenson, 2000).

Scar tissue is widely recognized as a primary cause of infertility (Lareau & Beigi, 2008; Simms & Stephenson, 2000; Wurn et al., 2008). Several researchers have found that the initial symptoms of PID include fever, abdominal and pelvic tenderness, and that the patient may go on to develop abscesses in the ovaries or Fallopian tubes (Lareau & Beigi, 2008; Wurn et al., 2008). Abscesses typically create scar tissue, as described by Ferguson and O'Kane (2004). Simms and Stephenson indicate that over one third of women with PID develop chronic pelvic pain, sometimes without any overt evidence of reproductive organ

damage. They suggest that infection itself causes scar tissue to accumulate, and the likelihood of developing tubal pregnancy due to scar-related occlusions increases without a PID diagnosis and appropriate treatment (Simms & Stephenson, 2000). Lareau and Beigi found that subclinical PID infections often go undetected and are likely to be considerably underestimated, with unknown effects on fertility rates. They suggest that the true medical burden of PID is also underestimated, because it is notoriously difficult to assess (Lareau & Beigi, 2008). The CDC and others name the risk factors for PID, which include younger age, multiple sexual partners, and certain patterns of contraceptive use, including the use of IUDs (Centers for Disease Control and Prevention, 2016; Lareau & Beigi, 2008).

Human papillomavirus (HPV). In 2003, Schneede and his group estimated that human papillomavirus (HPV) affected up to 30 million Americans (Schneede et al., 2003). According to many researchers, outcomes of HPV infection include genital lesions and pre-cancerous cellular development (Centers for Disease Control, 2015; Moscicki, Schiffman, Kjaer, & Villa, 2006; Schneede et al., 2003). Cancer can develop on the vulva, vagina, cervix, and anus (Centers for Disease Control, 2015). According to Chang and Welton, genital warts may be present on the vulva, or radiate out from the anus in infected individuals who have engaged in anal intercourse (Chang & Welton, 2004). Baxi et al. stated that because of lack of education and awareness of symptoms, many women never suspect they are infected (Baxi et al., 2013).

The CDC estimates that up to 43% of women are infected with HPV worldwide, and over 50% of sexually active people get infected once in their lifetime (Centers for Disease Control, 2010). HPV reportedly falls into the category of STIs that can be prevented and treated, but not cured (Schneede et al., 2003). The CDCP estimated that over 130 variants of

the infection had been identified as of 2010 (Centers for Disease Control, 2010). This number rose to 150 types by 2014 (Chung, Bagheri, & D'Souza, 2014). Forty variants affect the genital area (Centers for Disease Control, 2010).

Oral human papillomavirus type-16 affects the oropharynx, and is linked to throat cancer (Kreimer et al., 2010). Schneede's group reported that HPV infections were once diagnosed in women primarily by pap smears that pick up cells from the surface of the cervix. Researchers have been troubled by more recent trends in HPV-related disease, which show the development of cancer in the mouth and throat, due to genital/oral contact (Baxi et al., 2013; Young et al., 2015). Baxi's group explained that oropharangeal cancers due to HPV are among the fastest growing subset of cancers in the US, and that all oropharangeal tumors should be tested for HPV (Baxi et al., 2013). Young and colleagues argue that head and neck squamous cell carcinomas are increasing in adults ages 40–60, who have never smoked or used tobacco products, and that "[t]he reason for these changes is the human papillomavirus" (Young et al., 2015, para 1). They relate that treatment for HPV in the throat consists of a combination of chemotherapy and radiation and may include surgery. Muller et al. explain that each of these treatments has side effects, one of which is scar tissue (Müller et al., 2012).

Researchers commonly acknowledge that after an HPV diagnosis, treatment of the cervix for precancerous cell changes is a typical strategy (Darling et al., 2002; Frey et al., 2013; Hellsten, Lindqvist, & Sjöström, 2008). According to reproductive medicine specialist Licciardi, HPV itself can cause scar tissue, and many of the treatments for HPV cause scar tissue. He states that when infection follows tissue removal from an HPV treatment, scarring of the cervix is more likely to occur (Licciardi, 2010). Moscicki's research group argues that

dysplastic cells are precursors to cancer, and cause for genuine medical concern. When dysplastic cells are present, conventional medical treatment suggests that removal is necessary to prevent malignancies from developing (Moscicki et al., 2006). According to Licciardi, when pre-cancerous cells present on the cervix, HPV is an especially insidious cause of scar tissue, due to the methods used for removal of dysplastic cells near the os (cervical opening) (Licciardi, 2010). Researchers have indicated that scars around the os caused by treatments for HPV are implicated in preterm delivery and/or failure to progress during labor (Axman, 2011; Noehr, Jensen, Frederiksen, Tabor, & Kjaer, 2009; Ripley, 2010; Starkey, 2012; Thompson, 2014).

Women have reported in online childbirth forums and blogs that their midwives and obstetricians have treated scar-related occlusion of the os routinely during stalled labor scenarios (Axman, 2011; Ripley, 2010; Starkey, 2012; Thompson, 2014). However, many more women report that their obstetricians and midwives are not aware of cervical scarring due to HPV treatment, and that when labor stalled due to cervical scarring, an emergency C-section delivery was required (Axman, 2011; Thompson, 2014). According to Frey et al., scar tissue has the potential to affect the cervix, leading to structural and functional changes resulting from treatments for HPV. Frey further states "[t]he ability of the cervix after an excisional procedure to undergo the dynamic intrapartum changes of dilation and effacement to result in a successful vaginal delivery has been inadequately studied" (Frey et al., 2013, p. 2).

Following are brief descriptions of commonly used HPV treatments described in a 2007 Seminar article in the *Lancet*, as well as several other sources (Schiffman, Castle, Jeronimo, Rodriguez, & Wacholder, 2007; Chang & Welton, 2004; Samson, Bentley, Fahey,

McKay, & Gill, 2005; Schneede et al., 2003; Frey et al., 2013). These techniques focus on removal of suspicious cells from the cervix, as well as treatment of genital warts and other lesions caused by HPV. The relationship between the treatment and its potential to create scar tissue has been highlighted in each case.

Electrocautery uses a heated tool to remove genital warts. It can cause scar tissue by inducing first and second-degree burns. Chang and Welton report that when working near the anal sphincter, circumferential burns can cause sphincter narrowing and dysfunction (Chang & Welton, 2004).

Laser therapy is the destruction of infected tissue using a laser. It is used for the removal of cervical tissue and/or genital warts. Lasers cause burns much the same as radiation therapy and electrocautery (Samson, Bentley, Fahey, McKay, & Gill, 2005). Cryotherapy is the freezing of affected tissues. It is used for cervical tissue that shows dysplasia as well as for genital warts. Schneede and his group report that regardless of the therapy chosen to remove genital warts, they may persist in adjacent tissues, and continue to cause outbreaks (Schneede et al., 2003).

Loop electrosurgical excision procedure (LEEP procedure) uses a thin, live, low-voltage wire to cut away abnormal cervical tissue. Research suggests that depending on the depth of tissue excision, its use is associated with pre-term delivery and low birth weight infants (Noehr et al., 2009; Samson et al., 2005).

Cold knife biopsy or conization is a surgical procedure that removes a sample of tissue from the outer portion of the cervix. It is reportedly used when larger amounts of tissue must be excised (Schiffman et al., 2007). This method of treatment is also associated with preterm deliveries (Frey et al., 2013).

According to Frey's research group, each of the procedures outlined above causes scarring of the treated area, most notably the cervix. Much of the research to date about the effects of these procedures has focused on what happens to the fetus (low birth weight, pre-term delivery), while research about what happens to the mother during labor is limited (Frey et al., 2013). However, in blogs written by doulas (labor coaches), birth activists, midwives, mothers, and mothers-to-be, there are many references to scar tissue, which is characterized as affecting the cervix during labor due to earlier HPV treatments (Axman, 2011; Ripley, 2010; Starkey, 2012; Thompson, 2014).

There are many online accounts of cervical scar tissue and its negative effects on labor progression. Typically, these accounts tell the story of women who have had their scars treated by manual techniques during childbirth (Axman, 2011; Ripley, 2010; Starkey, 2012; Thompson, 2014). Thompson reports that manual treatment resulted in the reversal of failure to progress during labor, and a speedy delivery once the attending doctor or midwife was able to massage the cervix, manually clearing away the scar tissue in the cervical opening (Thompson, 2014).

According to anecdotal reports, HPV procedures and the inelastic, fibrotic scars they produce in the cervix affect the progress of labor, often leading to fetal distress and emergency cesarean delivery (Axman, 2011; Ripley, 2010; Starkey, 2012; Thompson, 2014). However, funded research studies to link the effects of cervical conization, LEEP procedures, and cervical biopsy to cesarean outcomes have failed to prove causation (Frey et al., 2013). Even so, a meta-analysis that tracked pregnancy outcomes between 1960 and 2007 for women who had cervical treatments for HPV suggested that "[a] reasonable hypothesis would be that the degree of obstetric morbidity noted between therapeutic procedures might

be related to the amount of the cervical tissue removed or destroyed" (Arbyn et al., 2008, p. 1).

HPV procedures have been reported to affect women's sexual function (Hellsten et al., 2008). In their 2-year Swedish study on sexual function subsequent to colposcopy (cervical examination that may or may not include biopsy), Hellesten and collegues concluded that "[t]wo years after referral for colposcopy, women in our study continued to report a negative impact on their sexual functioning, that is, lessened 'spontaneous interest' and decreased 'frequency of intercourse'"(p. 210). It is not reported whether it was the procedure itself or the fear of cancer that impacted these women's sexual interest.

Herpes. Xu et al. describe the herpes simplex virus as a sexually transmitted viral infection, falling into two categories that affect the genitals: herpes simplex virus 1 (HSV-1), and HSV-2. Xu's group reported that herpes simplex virus-2 is more frequently associated with genital lesions, but HSV-1 has been increasingly found to cause genital herpes outbreaks in the US, particularly among college students (Xu et al., 2006). CDCP reports reveal that the prevalence of HSV-2 has decreased, from 19.5% in 1994 to 15.3% in 2010 (Centers for Disease Control and Prevention, 2014). Alarmingly, a National Health and Nutrition Examination Study (NHANES) found that between 2007 and 2010, 87.4% of infected participants "reported never being told by a doctor or health care professional that they had genital herpes" (Centers for Disease Control and Prevention, 2014, para 10). Fanfair et al. suggest this has grave implications for the spread of the virus, and that innovative strategies are needed to deter the reach of the disease (Fanfair et al., 2013).

In a 1998 state-of-the-art clinical article, researchers found that HSV-2 outbreaks are rarely associated with long-term scarring (Whitley, Kimberlin, & Roizman, 1998).

Nonetheless, a case published in 1989 shows photos where a section of the inner lips of the patient's labia are completely adhered and closed over the space of the vaginal opening, after the patient tested positive for herpes simplex virus (Walzman & Wade, 1989). There are several additional reports of fusion of the outer with the inner lips of the labia after genital herpes infection (Brain, 1956; Haran, Crawshaw, & Natin, 1989).

For those who suffer multiple sexually transmitted infections, Tschanz et al. described how laser treatment has been used to treat the affected tissue. When topical treatments for herpes and HPV lesions failed, CO_2 laser treatment was used, and was shown to cause scar tissue to a depth of 5mm. This treatment was reported to cause subsequent vulvodynia, chronic pain upon contact to the surface of the vulva (Tschanz et al., 2001).

Gastrointestinal Infection. Gastrointestinal (GI) infection is often overlooked when observing the formation of scar tissue in the pelvis. However, according to the European Association of Urology, bacterial infections from unfamiliar gut and/or genital flora are frequently associated with sexual encounters with a new partner, with over 90% of UTIs resulting from *E. coli* infection (Naber et al., 2001). Gut flora and health expert Natasha Campbell-McBride and others argue that migration of damaging and or unfamiliar gut-flora from a new partner, or even from one's own gut, into the reproductive organs and urogenital tract represents a significant causation link between GI infection, STIs, and UTIs, resulting in scar tissue formation in response to the infective process (Campbell-McBride, 2009; Nezhat, 2012; Parsons, 2004).

There are many links in the literature between abdominal infection, adhesion, and painful sex. Many researchers agree that *E. coli* migration into the urogenital tract can cause persistent infection, scarring, and biofilm establishment in the urethra, bladder, ureters, and

kidneys (Mulvey, Schilling, & Hultgren, 2001; Naber et al., 2001; Panzera, 2007; Parsons, 2004). Other researchers have described how endogenous gut bacteria often migrate from the anus to the vaginal canal, and can move up into the uterus, where they irritate and ultimately scar the uterus and occlude the Fallopian tubes (Campbell-McBride, 2009, 2010; Wurn et al., 2009). Drollete and Badawy link pelvic adhesions to pelvic inflammatory disease (PID) and appendicitis (Drollette & Badawy, 1992). In their definitive paper on peritoneal adhesions, Liakakos and his group assert that peritoneal scarring can be caused by appendicitis, acute infection of the gall bladder, and colon infections such as diverticulitis (Liakakos et al., 2001). Steege and Zolnoun explain that IBS, Crohn's disease, interstitial cystitis, and diverticula of the urethra are linked to dyspareunia (Steege & Zolnoun, 2009). Hammoud and his group "hypothesize that intraperitoneal adhesions result in pain when they cause distortion of normal anatomic relationships and/or . . activities (such as running or intercourse)" (Hammoud et al., 2004, p. 1483).

Studies show that one third of women who have gynecological pain also have IBS (Williams, Hartmann, Sandler, W, & Steege, 2004). Brigham and Women's Hospital defines IBS as a chronic condition that expresses in acute episodes of diarrhea, often alternating with constipation. On their website, they list IBS as one cause of chronic pelvic pain (Brigham and Women's Hospital, 2015).

Many researchers agree that increased gut permeability (leaky gut) resulting from acute bacterial infection, poor diet, and/or over-exposure to antibiotics leads to gut dysbiosis, which has been shown to contribute to IBS symptoms (Campbell-McBride, 2010; Pimentel, 2013; Robilard, 2014; Rountree, 2014; Shanahan, 2007). Both Braunstein and Pimentel agree that one initial insult that catalyzed the development of IBS may have been an acute infection

of the gut caused by virulent bacteria (Braunstein, 2010; Pimentel, 2013). Gut permeability is associated with inflammatory bowel disease (IBD) and irritable bowel syndrome (IBS) and is also proposed as a risk factor for many autoimmune conditions (Odenwald & Turner, 2013; Rountree, 2014). However, Odenwald and Turner point out that association is not causation, and it is uncertain whether increased gut permeability is a cause or an effect of these or other underlying disorders (Odenwald & Turner, 2013). Voluminous additional research has established that those infectious processes contribute to abdominal adhesions as well as chronic pelvic and sexual pain (Campbell-McBride, 2009; Fasano, 2012; Hammoud et al., 2004; Liakakos et al., 2001).

The literature describes how chronic inflammatory cascades, resulting from intestinal permeability, may lead to autoimmune conditions in the brain, thyroid, adrenals, and ovaries (Fasano, 2012; Kharrazian, 2014; Perlmutter, 2014). A review article from 1996 suggests that autoimmunity can become the inflammatory ground from which adhesion molecules emerge (McMurray, 1996). Researchers have described how, when the immune system is chronically triggered due to unresolved inflammatory processes, other comorbidities such as PCOS (Duleba & Dokras, 2012), endometriosis (Agic et al., 2006), and interstitial cystitis (Sant, 2002) may develop. There is a plethora of clinical evidence that suggests inflammation as a common factor present in gut permeability, autoimmunity, PCOS, interstitial cystitis, endometriosis and adhesion formation (Eisenberg, Zolti, & Soriano, 2012; Schneider, 2013; Shanahan, 2007). According to Nezhat, severe adhesions create a condition called “frozen pelvis,” where there is little or no normal movement, and no palpable differentiation possible between the organs, muscles, and glands in the lower abdomen and pelvic bowel (Nezhat, 2012).

A direct causal relationship between gut flora composition, chronic inflammation, autoimmunity, and adhesion formation is now beginning to be corroborated and described by conventional scientific research (De Punder & Pruimboom, 2013; Eisenberg et al., 2012; Fasano, 2012; Shanahan, 2007). At least one autoimmune disease association and many doctors specializing in autoimmune conditions have noted that autoimmune diseases are rapidly increasing in the general population and are now reported in epidemic proportions (Amercian Autoimmune Related Disease Association, 2015; Fasano, 2012; Myers, 2010; Perlmutter, 2014). Autoimmunity creates a chronic inflammatory cascade that cannot be easily eliminated: "[U]nfortunately, when a self-molecule becomes immunogenic it cannot be eliminated; accordingly, inflammation becomes persistent and destructive" (Mackay, 2000, p. 95). The relationship between persistent inflammation and scar tissue is described in the introduction to this dissertation.

Parasites

Parasites have been identified by Wynn as a cause of inflammatory processes that lead to adhesion formation in the urogenital tract and reproductive organs (Wynn, 2008). During a parasitic infection, Allen and Wynn describe how immune cells activate a process of chronic granulation, creating local thickened collagen deposition in the ECM (Allen & Wynn, 2011). In an article about pelvic pain caused by threadworms, Thompson explains that fibrosis creates a walling-off of granulated areas within the adhesion formation (Thomson, 2004). Allen and Wynn hypothesized that certain aspects of immunity may have evolved to deal specifically with parasites and create this walling-off process, by producing fibrotic membranes that sequester parasitic infections (Allen & Wynn, 2011).

Research has identified several parasites that cause genital adhesions including threadworms, pinworms, and Schistosoma species (blood flukes) (Allen & Wynn, 2011; Feldmeier, Daccal, Martins, Soares, & Martins, 1998; Thomson, 2004; World Health Organization, 2017). Schistosomiasis is a condition caused when worms migrate from parasitized snails into human hosts (Feldmeier et al., 1998; Thomson, 2004; World Health Organization, 2017). Thompson maintains that schistosomiasis affects fertility by creating granulomas that situate in the fallopian tubes, and that these granulomas are followed by local fibrosis and tubal occlusion (Thomson, 2004). "We estimate that 6 to 27% of girls and women with intestinal schistosomiasis, at least temporarily, suffer from pathology induced by eggs sequestered somewhere in their genital organs" (Feldmeier et al., 1998, abstract). Allen and Wynn describe how these parasites create wounding and tissue damage: "Schistosoma mansoni, metazoan invaders literally tear through important barriers, often inducing micro-hemorrhages and tissue damage in multiple organs as they complete their life cycle" (Allen & Wynn, 2011, p. 1).

Thompson describes a young woman who presented with symptoms of endometriosis and was found to have threadworm ova embedded in her genital tissues. She reported that her family had had threadworms, and upon examination it was revealed that there were numerous adhesions near sites where the ova were found. It was assumed that "antigenic compounds of threadworm ova were responsible for both the local immune response in the form of chronic granulomatous inflammation, and the generalized autoimmune reaction" (Thomson, 2004, p. 94). Feldmeier noted that the autoimmune sequelae of parasitic infection have been shown to cause chronic inflammation of the vaginal mucosa and accompanying dyspareunia (Feldmeier et al., 1998).

Urinary Tract Infections (UTIs) and Interstitial Cystitis (IC)

Urinary tract infections are bacterial infections, and according to Foxman, rank as the most common of bacterial infections, and are typically treated with antibiotics (Foxman, 2003). Interstitial cystitis (IC) manifests as chronic urinary frequency, urgency, and burning, as well as pelvic pain. It is "characterized by recurrent inflammation and destruction of bladder tissues without obvious cause" (Anderson et al., 1989, abstract). The literature indicates discrepancies in the prevalence of IC, with estimates of infection that range between 3% and 20% of women in the US (Berry et al., 2011; Parsons et al., 2002).

Interstitial cystitis specialist C. Lowell Parsons argues that the prevalence of infection is close to 20% of women when those with unidentified sources of gynecological pain and dyspareunia are included (Parsons et al., 2002). According to Parsons, practitioners from differing specialties will come to differing diagnostic conclusions about the origins of urinary pain. Urologists will make one diagnosis, while gynecologists may come to a different conclusion when presented with the same set of symptoms (Parsons, 2003). Interstitial cystitis is recognized by a number of researchers as comorbid with dyspareunia, chronic pelvic pain (CPP), vulvodynia (pain at the introitus of the vagina), painful bladder syndrome, and endometriosis (Gardella et al., 2008; Ottem, Carr, Perks, Lee, & Teichman, 2007; Welk & Teichman, 2008). Hedelin and Parsons agree that the origins of UTI and IC comorbidities are multifactorial and difficult to identify, and that these conditions characteristically elude effective treatment (Hedelin, 2009; Parsons, 2003). Hedelin emphasizes that while antibiotic treatment for UTIs is ubiquitous, urologists' clinical management of interstitial cystitis and other UTI associated pain syndromes has been reported to be poor, despite many decades of research funding (Hedelin, 2009).

In an article from the *Journal of Urology*, Nickel and his group point out that the search for an inclusive etiological model of IC that looks at the many possible causes of urinary, pelvic, and sexual pain has led to a clinical phenotype system called UPOINT (Nickel, Shoskes, & Irvine-Bird, 2009). The UPOINT system looks at six domains that have been shown to have clinical relevance. Hedelin describes how elements in the UPOINT model arise from multivarious origins, and include "Urinary, Psychosocial, Organ specific, Infectious, Neurological/systemic, and Tenderness" (Hedelin, 2009, p. 68). Although broad in scope, the UPOINT model does not include scar tissue in its phenotypic model; Fitzgerald and her group suggest that urologists need to look even more broadly to accurately identify the causes and consequences of IC and its comorbid conditions (Fitzgerald, Link, Litman, Travison, & McKinlay, 2007).

According to Kaufman and other researchers, normal urinary frequency for women averages six to seven times each day. Patients diagnosed with bladder infections and interstitial cystitis may experience urinary frequency from 16 to 18 times a day (Butrick, 2007; Haran, 2009; Kaufman, 2001). Parsons suggests that if a history of systemic infections in the gut, urinary tract, and vagina have been observed, the structure and integrity of the bladder walls and urethral lining will become compromised, leading to symptoms of urinary burning, frequency, and urgency (Parsons, 2011). Several divergent researchers agree that when chronic infection has been present, urine itself has a higher level of toxicity, and will contribute to irritation of the urethral and bladder lining (Campbell-McBride, 2009; Kaufman, 2001; Parsons, 2003, 2011).

Kaufman, Parsons, and Haran have each pointed out that chronic or long-term bladder irritation can lead to chronic pelvic pain, and especially to painful bladder syndrome (Haran,

2009; Kaufman, 2001; Parsons, 2011). Haran explains that as with other visceral pain patterns, bladder pain may be referred into the pelvic floor, inner thighs, low back, and genitals, and especially to the vaginal vault (Haran, 2009). Butrick states that cross talk between nerves that serve the bladder, reproductive organs, and genitals is common in interstitial cystitis, endometriosis, and chronic pelvic pain, which confounds specific diagnosis in many cases (Butrick, 2007).

Women who experience painful intercourse frequently have been identified as having scars and adhesions in the urinary tract and genitals related to a history of UTIs and/or IC (Butrick, 2007). Sant and Parsons agree that although scars can cause some of the pain associated with IC and other pelvic pain syndromes, chronic infection and IC also cause damage to the bladder and urethral lining, resulting in the formation of scar tissue (Parsons, 2011; Sant, 2002). According to Wurn and her group, scars from UTIs occur in different locations than those for IC. They describe how scar tissue due to UTIs may affect the urethra and proliferate through the para-urethral glandular tissue to the upper vault of a woman's vagina (Wurn et al., 2009). Others found scar tissue associated with IC to occur in the bladder itself, with pain referral into the pelvic floor, low back, groin, and/or lower abdominal area (Butrick, 2007; Kaufman, 2001; Teichman & Parsons, 2007).

Complicated UTIs are another source reported to cause scar-related problems, including bladder pain, urinary frequency, and voiding urgency. Complicated UTIs are caused by ureter or urethral obstruction, catheterization, and subsequent voiding delays (American College of Emergency Physicians, 2011). In a paper about female urinary tract infections, Hooton et al. acknowledge that "[c]atheter-associated (CA) bacteriuria is the most common health care–associated infection worldwide and is a result of the widespread use of

urinary catheterization, much of which is inappropriate, in hospitals and long-term care facilities" (Hooton et al., 2010, p. 625). Hooton et al. state that as many as 40% of nosocomial (hospital acquired) infections are due to catheterization and may not present urinary tract symptoms. According to Pandey and colleagues, women are frequently catheterized during childbirth, and ubiquitously so during cesarean section (Pandey, Mehta, Grover, & Goel, 2015). Catheters are also reportedly used in the immediate postpartum period and contribute to infections and the scars they may cause (American College of Emergency Physicians, 2011). The Merck Manual describes other causes of voiding dysfunction, including urethral strictures (narrowing of the urethra), which can be caused by "radiation therapy, surgery, or procedures done on the urinary tract" (Preminger, 2016). Surgical intervention for urinary issues often leads to sling placement, which is associated with numerous scar tissue and adhesion-related complications (David-Montefiore et al., 2006). For more information about sling usage and placement see the Surgery section of this dissertation.

Endometriosis.

Several researchers describe endometriosis as a painful, enigmatic, and poorly understood condition that affects 10–15% of women overall, and 50–60% of women and teenage girls who complain of pelvic pain (Al-Jefout et al., 2009; Giudice, 2010). It is reported to be under-diagnosed, as the only definitive diagnostic procedure shown to confirm the presence of this disease is laparoscopic visualization (Herington, Bruner-Tran, Lucas, & Osteen, 2011).

The symptoms of endometriosis vary from woman to woman, and according to Stratton and Berkley, are not necessarily tied to the presence endometrial lesions (Stratton &

Berkley, 2010). Schneider-Milo describes symptoms that include a wide spectrum of pain presentations before and during menstruation as well as IBS-like abdominal pain, bloating, nausea, constipation, and dyspareunia (Schneider-Milo, 2011). Other reported symptoms include low back pain, leg and loin pain, fatigue, and pain during urination, ovulation, and bowel movements (Al-Jefout et al., 2009; Giudice, 2010; Montalto et al., 2010; Schneider-Milo, 2011; Stratton & Berkley, 2010).

Many researchers agree that a complete understanding of the etiology and pathogenesis of endometriosis remains unclear (Al-Jefout et al., 2009; Dell, Mokrzycki, & Jayne, 2009; Nothnick, 2001; Sourial, Tempest, & Hapangama, 2014). It has been examined as an autoimmune disorder (Eisenberg et al., 2012), as a byproduct of imbalance in intestinal flora in primate studies (Bailey & Coe, 2002), and as the result of endocrine disruption (Ballweg, 2004). Ballweg also suggests that endometriosis is linked to exposure to immunotoxicants such as dioxin. Other research suggests that endometriosis is linked to use of ovarian steroids (Herington et al., 2011).

Health problems that are commonly associated with endometriosis include autoimmune disease and chronic inflammation. These related conditions are often driven by gut permeability (Campbell-McBride, 2010; Montalto et al., 2010; Stratton & Berkley, 2010). Symptom overlap with endometriosis reportedly includes interstitial cystitis (Teichman & Parsons, 2007), autoimmune conditions such as celiac (Eisenberg et al., 2012; Mormile & Vittori, 2013), Crohn's disease, IBS, IBD, and PCOS (Bharadwaj, Barber, Graff, & Shen, 2015).

Endometriosis affects millions of women in the US and Canada, and many more millions of women worldwide, according an actuarial analysis by Mirkin, Murphy-Barron,

and Iwasaki (2007). According to both clinicians and researchers, this condition is one of the leading causes of abdominal adhesions (Diamond et al., 1987; Fontaine, 2012; Liakakos et al., 2001; Weijenborg, 2009; Wurn et al., 2011). Endometriosis is generally defined by the migration and growth of uterine lining tissues that have escaped the confines of the uterus and have attached to intra-abdominal and/or pelvic structures (Butrick, 2007; Giudice, 2010; Sourial et al., 2014). However, Stratton and Berkley strongly suggest and cite several references supporting the concept that the painful symptoms of endometriosis are generated not by lesions, but by the central nervous system, stating, "[d]efinitive criteria determining which, if any, endometriosis lesions cause pain symptoms are lacking. In carefully documented studies, location and extent of lesions bear little relation to location or amount of pain a woman experiences" (Stratton & Berkley, 2010, p. 328).

It has been reported that for many women, it takes an average of 6–10 years to arrive at a definitive diagnosis for endometriosis (Al-Jefout et al., 2009). Al-Jefout et al. suggest that during this lag time between symptom presentation and a definitive diagnosis, nerve fiber generation within the endometrium has time to mature, and their study suggests linkage between nerve fiber density within endometrial masses and the intensity of pain presentation. Adhesions were found to be present at stage IV endometrial presentation in this study, and Liakakos et al. states that "[f]ibrous adhesions often form as a response to chronic irritation of the peritoneal surface by the endometriotic implant and its secretory products" (Liakakos et al., 2001, p. 262).

In addition to endometrial tissue found outside of the uterus in and around the reproductive tract, this tissue has been found to implant on and around the bladder and ureters, and also outside of the peritoneal cavity (Giudice, 2010). Endometrial tissue is

occasionally found in areas quite distal to the uterus, such as the diaphragm, lungs, pericardium, and even the brain (Giudice, 2010; Montalto et al., 2010; Wurn et al., 2011). Both Wurn et al. and Liakakos et al. reported that endometrial tissues secrete products that initiate an inflammatory cascade and lead to adhesion formation radiating out from where these uterine tissues adhere (Liakakos et al., 2001; Wurn et al., 2011). Relating endometrial spread to scar tissue, Giudice finds the connection to be clear: "[t]his response is accompanied by angiogenesis, adhesions, fibrosis, scarring, neuronal infiltration, and anatomical distortion, resulting in pain and infertility" (Giudice, 2010, abstract).

Giudice reports that treatments for endometriosis include hormonal control, especially low estrogen birth control pills, as well as GnRH agonists (synthetically modified gonadotropin releasing hormone), anti-inflammatory drugs and hysterectomy (Giudice, 2010). As described in the Surgery section of this dissertation, hysterectomy is associated with pelvic organ prolapse, abdominal adhesions, and other scar-related complications. To compound the damage done by the condition itself, Liakakos et al. found that the surgical removal of ovarian endometriomas is associated with additional fibrous adhesion formation (Liakakos et al., 2001). According Wurn and her group, "patients develop adhesions after laparoscopic excision of endometriosis for pelvic pain and are at an even higher risk to reform [adhesions] after a second surgery" (Wurn et al., 2011, p. 189). Painful intercourse has been strongly linked to this enigmatic and frustrating condition (Fauconnier & Chapron, 2005; Jarząbek-Bielecka, Radomski, Pawlaczyk, Friebe, & Biedermann, 2010). Using surgery, particularly hysterectomy, which has a strong statistical association to adhesion formation, to resolve endometriosis, contributes to the problem of dyspareunia (Wurn et al., 2011).

Scar endometriosis has been defined as a condition in which endometrial tissue is introduced into surgical scars (Nominato et al., 2010; Pikoulis et al., 2011; Uzunçakmak, Güldaş, Özçam, & Dinç, 2013). Researchers have described how endometrial tissue within a scar, caused by a surgical incision, swells and becomes painful in cyclic synchrony with the patient's menstrual cycle. This is a rare condition, but it is reported to be under-diagnosed (Pikoulis et al., 2011; Uzunçakmak et al., 2013). It is not known exactly how endometrial tissue gets into surgical scars, but it is hypothesized that it may happen during abdominal surgeries or through lymphatic or vascular pathways (Nominato et al., 2010; Uzunçakmak et al., 2013). If a woman has pre-existing endometriosis, researchers hypothesize that any abdominal surgical procedure would have the potential to introduce endometrial tissue into surgical incisions during the process of suturing (Nominato et al., 2010). These authors point out that studies suggest cesarean section, in particular, greatly increases the risk for scar endometriosis, although scar endometriosis has also been found in episiotomy incision sites as well.

Hormonal Manipulation

According to holistic psychiatrist Kelly Brogan, the deliberate use of exogenous hormones for purposes of birth control, relief from the pain of endometriosis, and menopausal symptoms has been recorded as common medical practice for over 60 years (Brogan, 2013). Brogan suggests that increasing environmental exposure to xenoestrogens has been less deliberate. She and others express concern that women are exposed to these dangerous chemicals from food packaging, pesticides, PVC plumbing pipes, BPA (plastic byproducts) that leach into baby bottles and water bottles, and as soy-based foods (Braniste et al., 2010; Brogan, 2013; Daniel & Onisic, 2012; Foster, 2000). The effects of

xenoestrogens include increases in gut permeability (Fasano, 2014); increased risk of breast, uterine, and thyroid cancers (Foster, 2000); and increases in chronic inflammatory and autoimmune conditions (Vojdani, 2014). Exogenous estrogens have also been shown to affect the population balance of beneficial gut flora (Braniste et al., 2010; Brogan, 2013; Campbell-McBride, 2010).

Research suggests that hormonal birth control methods are introduced at earlier ages and are used for longer periods of a woman's life than ever before (Piltonen et al., 2012). Xenoestrogens, including the exogenous estrogens from birth control and hormone replacement therapy (HRT), are linked to many health problems, both directly and indirectly (Brogan, 2013; Foster, 2000; Safe, 2000). The use of oral contraceptives (OCs) has been linked to chronic inflammation, increases in insulin resistance, and the suppression of healthy gut flora (Brogan, 2014; Campbell-McBride, 2010; Piltonen et al., 2012). It has been suggested that women at high risk of metabolic disease monitor their glucose metabolism carefully while taking oral contraceptives (Piltonen et al., 2012). Oral contraceptives are also linked to blood clotting disorders, stroke, heart disease, and diabetes (Seaman, 1995; Sellman, 1998). They are also thought to contribute to mutagenic changes in fetal development, leading to autism, as well as problems in sex differentiation by affecting the ovarian production of the oocyte (egg) (Brogan, 2014; Strifert, 2014).

Brogan and Campbell-McBride state that a diverse and healthy gut flora should naturally degrade both endogenous and exogenous estrogens, rendering them into benign metabolites (Brogan, 2013; Campbell-McBride, 2010). Foster suggests that when estrogen fails to be degraded in the gut, it circulates into the bloodstream, and into the liver for further breakdown (Foster, 2000).

> Our bodies regulate and eliminate estrogens by the action of detoxifying enzymes in the liver. There are two pathways of estrogen oxidation and conversion, one of which converts it to a beneficial and non-toxic form 2-OH estrogen and another which converts it to the 16-OH estrogen form. The 16-OH form is carcinogenic and causes diseases of tissues that are responsive to hormones, including disorders and cancers of breast, uterus, cervix and prostate, and probably lung and colon. Xenoestrogens push the system toward the 16-OH pathway both directly and indirectly. (p. 1)

Many cancers are known to be estrogen dependent (Foster, 2000; Safe, 2000). Foster, Safe, and Brogan each state that when estrogens, both endogenous and exogenous, cannot be broken down into benign metabolites, the excessive accumulation of toxic forms of estrogen in the tissues of the body can lead to proliferation of those body tissues (Brogan, 2013; Foster, 2000; Safe, 2000). Foster details how glandular tissue including the breasts, uterus, ovaries, prostate, and thyroid are particularly sensitive to these estrogenic compounds (Foster, 2000). When cancer is the outcome of prolonged estrogen dominance, scar tissue is described as an inevitable outcome of both operative and radiation treatments (Schover, 2005; Schroder et al., 2005).

As the literature has described, the relationship between estrogen and its potentially cancerous outcome can be a self-reinforcing loop, a kind of vicious cycle. Although scars are not directly caused by estrogen, the effects of insufficient breakdown of estrogens in the gut and liver can lead to cancer, which often leads to radiation and/or surgery, especially in reproductive tissues (Brogan, 2013; Schover, 2005; Schroder et al., 2005). As stated in the

Surgery section of this dissertation, these treatments cause scar tissue, and the proliferation of that scar tissue may interfere with sexual function and cause pain during sexual encounters.

Biomechanics: Scars, Adhesions, and Posture

Scars, as described by Medici, are physical remains of physical traumas, and public awareness of their long-term effects is growing (Medici, 2013d). Blogs, online videos, and podcasts by Sexological Bodyworkers and others point out that scars affect many aspects of life, from the postural to the sexual (Clements, 2015; Heed, 2017; Johnson, 2013; Medici, 2011a, 2012c). While visible scars are reminders of physical traumas, their deeper adhesive sequelae are well described by yogis, Rolfers, somatic psychologists, and somatic educators. These adhesions are characterized as indicative of emotional traumas, buried within the body's fascia, and caused by postural adaptations to emotional stress (Barral & Croibier, 1999; Dychtwald, 1977; Forrest, 2011; Johnson, 1977; Keleman, 1985; Levine, 2010; Medici, 2013d; Milne, 1995a; Pierrakos, 1987; Rolf, 1989; Schultz & Feitis, 1996; van der Kolk, 2002a).

As many somatic (body-based) experts have noted, scar tissue and adhesions are created by fascial, muscular, and organ compression resulting from postural habits. According to Rolf and her followers, as well as Reich and his students, these adhesive interstices within body structures often represent a locus of unresolved emotions (Johnson, 1977; Keleman, 1985; Pierrakos, 1987; Reich & Carfagno, 2013; Rolf, 1977). This unconscious tension is described as a tenacious remnant of troubling past events (Forrest, 2011; Johnson, 1977; Rolf, 1977). Somatic practitioners agree that as tension becomes sublimated in the body's myofascial and neurological continuum, these body memories often have adhesive consequences, which present physical limitations to

otherwise free postural and sexual expression (Barral & Croibier, 1999; Gaskin, 1990, 2003; Haines, 1999; Rolf, 1977; Rothschild, 2000; Spiegelman, 1992).

Wilhelm Reich characterized muscular patterns of emotionally held tension as "character armor" in his seminal book *Character Analysis*, originally published in 1933 (Reich & Carfagno, 2013). In his book documenting the origins of somatic psychology, Barratt relates that Reich's students were progenitors of a body-based approach to psychology. These approaches then spawned yet more versions of body-based therapies, as a third post-Reichian generation pursued their own inquiries into relationship between body and mind (Barratt, 2010). Barratt describes dozens of these modalities, developed to reveal and then peel through layers of embodied emotional patterns.

According to Reich, his students, and their followers, specific postural patterns of character armor are associated with distinct personality typologies. Pierrakos, Lowen, and Keleman each developed their own way of classifying character types with postural habits, which they linked to particular clusters of behavioral habits and personality styles (Keleman, 1985; Lowen, 1958; Pierrakos, 1987). Many of these patterns were perceived to be buried within posture and physical structure, and readable as body types (Keleman, 1985; Lowen, 1958; Pierrakos, 1987; Reich & Carfagno, 2013; Samsel, 2013). Samsel speculates whether fascial properties and behavior reflect the condition of the psyche in his blogs (Samsel, 2013).

Spiegelman, Barratt, and Medici describe how Reich used physical touch with his patients in order to peel through layers of physical adhesions, which he called "character armor" (Barratt, 2006; Medici, 2013d; Spiegelman, 1992). Reich also worked with breath patterns, having patients move and walk around the room, and occasionally disrobe in

order to better visualize their patterns of body armoring (Barratt, 2010; Spiegelman, 1992). Spiegelman recounts, and Medici emphasizes, that when Reich succeeded in releasing these patterns of tension, patients reported new sensations of energy moving through their bodies, as intense tingling and *streamings* (Medici, 2013d; Spiegelman, 1992).

The release of held energy is well documented in writings about esoteric Eastern embodiment practices, which define a tingling sensation of warmth, similar to that described above by Reich, Spiegelman, and Medici, as "qi" (Beinfield & Korngold, 1991; Boadella, 1997; Medici, 2013d). Vedic medical traditions define this sensation as "prana" (Barratt, 2010; Boadella, 1997), and tantric yoga traditions use the word "kundalini" (Barratt, 2010; Feuerstein, 1997; Sovatsky, 1999). Barratt and Boadella describe these streamings as the liberation of bioelectrical energy, which Reich characterized as "orgone," which in this case represents repressed sexual impulses or life force (Barratt, 2010; Boadella, 1997; Reich, 1973).

Whether defined as *qi*, prana, streamings, or kundalini, practitioners across a broad array of healing modalities define life-force energy as a sensation perceptible to both the practitioner and the client (Barratt, 2006, 2010; Brenner; Chia, 1986; Medici, 2013d; Milne, 1995a; Sovatsky, 1999; Spiegelman, 1992). In addition to Asian traditions of healing, certain branches of osteopathy (particularly cranial osteopathy), also embrace the view that vital energy can be felt as a noticeable quality in the flesh (Cisler & Fulford, 2003; Milne, 1995a; Still, 1899; Sutherland, 1939).

Franklin Sills describes how William Sutherland created the discipline of cranial osteopathy and named this energy "the breath of life" in the early part of the 20th

century, in his book about biodynamic craniosacral therapy (Sills & Degranges, 2001; Sutherland, 1939). Craniosacral trainer Hugh Milne has commented that the palpable quality of this energy may appear to be elusive or ineffable to the uninitiated (Milne, 1995a).

In his review of Comeaux's biography of philosopher/osteopath Robert Fulford, Leon Chaitow, ardent fascia enthusiast, co-founder of the Fascia Research Society, and the biannual International Fascia Research Congress, selected this quotation as representative of Fulford's osteopathic point of view:

> The human body is composed of complex streams of moving energy. When the energy streams become blocked or constricted, we lose the physical, emotional, and mental fluidity potentially available to us. If the blockage lasts long enough, the result is pain, discomfort, illness and distress. (Comeaux, 2005, p. 159)

The blockage described above by Fulford is at least partially attributable to scar tissue, according to Medici (Medici, 2016c).

Medici teaches emphatically that imbalance within any of the Four Domains of health acts as an obstacle to the perceptible movement of what Fulford describes above as life-force energy (Medici, 2012b, 2012c). Medici stresses that energy blockages are often felt as numbness, or lack of ability for clients to track the perception of warmth spreading throughout their own meridian systems. He reports when scar tissue is resolved and normalized, the main metric for determining efficacy of treatment is the initiation or a return of these warm, melting, tingling sensations throughout the meridian system, located among the layers of body tissues (Medici, 2012b, 2012c, 2015c, 2016c).

Medici has interpreted the physiological origin of the feeling of "tingling" as the perfusion of fresh blood, nerve delivery, and the opening of fresh lymphatic drainage (Medici, 2016c). He states this is due to rapid recalibration after a lifetime of adhesions from tissue compression, resulting from habitual posture and patterns of tension (Medici, 2013d). Pischinger describes at length that scars create interference fields, or blockage to the free movement of fluids and neural impulses, which are vital for health in the ECM (Pischinger, 2007). He goes on to state that "[t]he common denominator of all biological reactivity is its energy flow. Biological energy can be understood quantitatively and qualitatively as biodynamics (reactions between biological objects) and bioenergetics (transformations in quality between energy and mass)" (p. 66). This has implications for scar tissue. Hinz suggests that scars are seen as potentially causative agents in the genesis of cancer (Hinz, 2015). According to Boadella, Reich was able to link deficient cellular respiration to cancer as early as the 1930s, using "simple tests for detecting the tendency to cancer through microscopic observations of states of luminescence and cohesiveness in red blood corpuscles" (Boadella, 1997, para 6).

Ida Rolf made the connection between systemic scar tissue or adhesions, and emotional holding patterns in her seminal work, Rolfing, The Integration of Human Structure, published in 1977 (Rolf, 1977). How best to liberate and resolve such emotional tension, characterized by Rolf as protection—around a tender or wounded, but embodied psyche—has been a matter of some debate. Barratt describes somatically based methods that range from the dramatic and dynamic hands-on techniques of Rolfing or deep post-Reichian bodywork, to the interpersonal and conversational interaction of conventional psychotherapy (Barratt, 2010). Barratt and others elaborate that the

spectrum of potential experiences of somatic work is broad, and ranges from intensely cathartic, often painfully deep pressure into muscles and fascia, aimed at dissolving longstanding and unexamined patterns of psychogenic holding, to the gently probing verbal prompts and intimate free association of dream analysis (Bail, 2007; Barratt, 2010; Spiegelman, 1992).

Although traditional analysis and talk therapy are not touch-based, many who practice these methods claim to be working directly with body-based perceptions (Bail, 2007; Barratt, 2010; Rosenberg, Rand, & Asay, 1985; Yalom, 2012). In order to reach the client with greater immediacy, psychotherapeutic practitioners have reported the incorporation of movement, self-touch, and embodied mindfulness techniques into their sessions (Bail, 2007; Barratt, 2010; Minton, Ogden, Pain, Siegel, & van der Kolk, 2006; Rosenberg et al., 1985; Siegel, 2007). In a webinar, Bessel van Der Kolk noted that physical touch is often perceived to be outside of the scope of practice for psychotherapists: "of course, nobody is exploring touch because touch is anathema in psychiatric culture. You can't really get better from trauma unless it feels safe and comforting to be touched—to touch and be touched" (van der Kolk, 2013, p. 11).

Stress Response and Habitual Gestures

In a paper about somatic psychology, Veronique Mead mentions a brief history of somatic psychotherapeutic modalities that work with habitual movements, or repetitive gestures, pointing out that, according to Reich, habitual patterns of movement hint at underlying unconscious material (Mead, n.d.). Structural Integrator and fascial researcher Robert Schleip discusses a relationship between postural habits and instinctual body-based responses to stress. He explains that the contraction of the flexor muscles, which

pull the front body toward a fetal position, is part of an instinctual startle reflex (Schleip, 1993). Medici notes that unresolved emotion from early and chronic activation of the startle reflex can cause a chronic contraction of the deep muscles of the neck (scalenes), resulting in anterior (forward) head carriage (Medici, 2011b, 2013b).

Rolf noted that "[y]ou must remember that in your appreciation of a body what you are looking at is the relationship between flexors and extensors" (Rolf & Feitis, 1990, p. 69). Van der Kolk and others have expressed that with trauma, especially PTSD, there is often an unrelieved sense of danger (van der Kolk, 2014). The neck muscles become stiff, as if frozen in a deep and chronic gesture of hypervigilance (Gold, 2000; Hanna, 1988; Rolf & Feitis, 1990; Schleip, 1993). Conversely, massage educator Erik Dalton has suggested that neck tension caused by a gesture of frozen startle response can also generate hyperarousal: “sustained isometric contraction in the capital extensor [posterior cervical] muscles places the entire nervous system in a heightened state of alert” (Dalton, 2011, para 3).

Rolf and Medici emphasize repeatedly that nerve compression where the neck meets the skull, from posturally derived adhesions, is one of the outcomes of neck tension, jaw clenching, and other signs of hyper-arousal (Medici, 2011b, 2013b, 2013c; Rolf, 1989). Midwife Ina May Gaskin and cranial sacral trainer Hugh Milne each comment that upper body reactions to the perception of danger are often mirrored in the lower body as chronic contracture of the buttocks, low back, and pelvic floor muscles (Gaskin, 2003; Milne, 1995b). This kind of chronic holding results in a variety of organ and sexual problems, including interstitial cystitis. This leads to local inflammation and:

> The swelling of the bladder and inflammation causing congestion and mechanical tension in the pelvic area along with possible adhesions pushes on the vessels and nerves of other organs in the pelvis which can interfere with bowel and reproductive function. (Moffat, n.d.)

In her books about midwifery and childbirth, Gaskin notes that there is also a connection between muscular tension in the jaw and tension in the muscles of the pelvic floor, which dampens sexual pleasure and of the function of reproductive organs (Gaskin, 1990, 2003). She states, "[t]he state of relaxation of the mouth and jaw is directly correlated to the ability of the cervix, the vagina, and the anus to open to full capacity" (Gaskin, 2003, p. 170). Milne teaches (personal communication, December 16, 2005) that when the jaw is tight, the muscles and organs of the pelvic floor will reflect that tension. As with a tight neck, sex educator Sheri Winston mentions that a tight pelvic floor, and the adhesions it generates, compress nerves that communicate sexual messaging (Winston, 2010).

Stress Response and Habitual Posture

Rolf taught that structure follows posture, posture follows gesture, and gesture follows emotion (Rolf & Feitis, 1990). Rolf, Schleip, Feldenkrais, and Ruderian (personal communication December 19, 2015) have each expressed that the gesture of the startle response is to thrust the head forward, collapsing the cervical spine, moving toward protection of the heart and other vital organs (Feldenkrais & Ginsburg, 2005; Rolf & Feitis, 1990; Schleip, 1993). As this gesture becomes habitual, Rolf suggests it will progress into postural adaptation, indicative of chronic stress (Rolf & Feitis, 1990). Medici and Milne state that as the head moves forward into the posture of anterior head

carriage, this becomes a source of constant pressure between the occiput and the first cervical vertebra, and results in compression of important cranial nerves (Medici, 2013b; Milne, 1995b). Medici emphasizes that the vagus and hypoglossal nerves get compressed when the head is always thrust forward (Medici, 2013c, 2013g). Porges and Sundahl confirm that each of these nerves affects sexual function (Porges, 1998; Sundahl, 2003). Several papers about female sexual desire also suggest a relationship between nerve compression and sexual function (Giraldi et al., 2004; Komisaruk et al., 2004). According to chronic pelvic pain specialist Jerome Weiss MD, when nerve compression becomes chronic due to adhesion formation, so does sexual dysfunction (Weiss, 2003). Medici agrees that when a chronic startle response becomes encoded as a postural pattern, pelvic and cranial nerves get compressed, and sexual function and expression are attenuated (Medici, 2016b).

Guyton and Hall, and Medici describe patency of the vagus nerve as central to autonomic balance (Guyton & Hall, 2000; Medici, 2013g), and Medici further emphasizes that patency of the vagus nerve will be affected by anterior head carriage (Medici, 2011a, 2013b, 2013c). Porges describes the vagus nerve as a motor nerve that regulates smooth muscle responses, as well as subconscious responses to the perception of safety of incoming stimuli (Porges, 1998, 2004, 2013). Both Porges and Medici suggest that it is patency (unrestricted transmission) of impulses to and through both the ventral and dorsal aspects of the vagus nerve that is required for balance between the sympathetic and parasympathetic branches of the ANS (Medici, 2013b, 2013c; Porges, 1998, 2003, 2013). Sexual researchers agree that appropriate balance and precise cueing between the sympathetic and parasympathetic branches of the ANS is required for the

complete trajectory of sexual arousal to occur (Graziottin & Giraldi, 2006; Gruenwald, Lowenstein, Gartman, & Vardi, 2007; Levin, 2002; Pasqualotto, Pasqualotto, Sobreiro, & Lucon, 2005).

Physiology textbooks teach that smooth muscle contractions are regulated by the autonomic nervous system (Guyton & Hall, 2000; Netter, 1991), and Shleip and others suggest that there is smooth muscle distribution within the fascial tissue beds of the back of the body (Schleip, 2003b; Schleip et al., 2006; Staubesand & Li, 1996). Constant sympathetic up-regulation, a common feature of stress, is known to cause smooth muscle contraction according to Medici (Medici, 2014a). Schleip further suggests that sympathetic up-regulation of the ANS may cause contraction of the smooth muscle cells found in the fascia of the low back, causing a contracture of the fascia itself (Schleip, 1991, 2003b, 2003c). Medici extrapolates that connective tissue stiffening or adhesions at the nuchal ligament located at the posterior cervical/cranial interface contribute to vagus and hypoglossal nerve compression, affecting the autonomic balance required for healthy sexual function (Medici, 2015a, 2016b, 2016c).

A Reciprocal Relationship: Posture and Scars

The writings of Ida Rolf state that when habitual gesture begins to solidify as posture, those postural changes accumulate, affecting spinal alignment. She also taught that misalignment of head, spine, and pelvis reflects negative functional changes as the relationship of each body segment distorts over time (Rolf, 1977). This constant subclinical nerve compression diminishes ANS balance, contributing to sexual as well as digestive and reproductive dysfunction (Rolf, 1989). Rolf, summarizing the work of Feldenkrais, says that the startle response not only affects the flexors of the neck that pull

the head forward, it affects the hip flexors as well, re-aligning the entire body (Feldenkrais & Ginsburg, 2005; Rolf, 1989).

According to Rolf and many body workers she has influenced, the psoas is one of the most significant muscles to determine postural alignment and integrity (Koch, 2004; Myers, 2001; Rolf, 1977, 1989; Schultz, 1999). Rolfers have stated that a short, tight psoas will make an inguinal hernia more likely, by pushing the intestines forward toward an already weak area of the inguinal canal (H. Ruderian, personal communication December 19, 2015; Schultz, 1999). Surgery to repair inguinal and umbilical hernias commonly causes scar-related problems leading to sexual pain (Al-Jabri, 2009).

Medici has taught that when the psoas moves forward toward a more superficial placement, it may become functionally affected by scar tissue from a hernia repair, as well as a C-section or appendectomy (Medici, 2012a). Muscolino explains that trigger points (adhesion-related tender spots) in the psoas often entrap the genitofemoral nerve, which emerges from the belly of the psoas itself, and generates impulses to genital tissues (Muscolino, 2009). Plastic surgeons point out that nerve entrapment of the genitofemoral nerve can also create paresthesias (painful sensations) into its terminus in the labia majora, due to scarring, or from overly aggressive removal of tissue during cosmetic procedures (Rubin, Jewell, Richter, & Uebel, 2012). Others explain that this nerve can also become tangled in scar tissue from a hernia repair or low, wide C-section (Loos et al., 2010; Yuhara, 2013).

Luijendijk et al. suggest that scar tissue from surgical procedures such as appendectomy, hernia repair, or C-section can infiltrate the fascia that surrounds and interpenetrates the areas surrounding the structurally central psoas muscle (Luijendijk et

al., 1997). Medici has explained that flexibility becomes further constrained due to the postural accommodation due to scar tissue caused by these procedures, which affects balance in the pelvis and distorts the spine's natural curvatures (Medici, 2014b). As a result, sexual and elimination functions can each become compromised (Medici, 2015a). Demirer et al. suggest that there may also be pain from nerve compression as nerves get caught and impinged in the scar tissue from these inadvertently invasive procedures (Demirer et al., 2006).

Many experts in human biomechanics have stated that when postural tension from a tightened or scarred psoas engrains as habit, chronic low back pain becomes the norm (Bond, 2007; Cyriax, 1982; Myers, 2001; Rolf, 1989; Sarno, 1984). Nerves in the lumbar spine become irritated due to compression from the bones of the lumbar spine that are now squeezed too close to each other, impinging nerve spaces (Cyriax, 1982). Scar tissue builds up between tight bony junctions and is out of reach of most manual therapy (Medici, 2012a). The nerves that emerge from between the vertebrae of the lumbar spine and sacrum innervate the pelvis and pelvic floor, including the genitals (Netter, 1991; Winston, 2010). Medical doctors and structural therapists agree that when the lumbar spine is compressed and the sacrum is immobilized, nerves that should have freedom to propel neural impulses become compressed (James, Castaneda, Miller, & Findley, 2009; Lee et al., 2008; Rolf, 1989; Weiss & Prendergast, 2006; Wise & Anderson, 2010).

Women who have C-section scars have had their lower abdominal muscles separated from blood and nerve supply or incised. Numbness from the scar across the bottom of the rectus abdominis (six-pack) muscle often makes it nearly impossible to feel and engage this crucial low abdominal muscle (Megan, 2011). Both the scar tissue itself

and the numbness it causes make it difficult to connect to and contract this postural support, which is a major contributor to core engagement, stabilization, and an upright and balanced alignment (Bond, 2007; Rolf, 1989). In their book, the Wurns remind the reader that there is a reciprocal relationship between scar tissue and habitual patterns of postural compensation (Wurn et al., 2009).

Physiotherapist Diane Lee defines diastasis recti as a condition that results from pregnancy, in which the fibers of the rectus abdominis muscle pull away from the midline, serving to weaken lower back and abdominal support (Lee et al., 2008; Lee, 2012). According to Pan et al., the combination of an incompetent psoas with a numb and a weakened rectus abdominis cannot provide support for the lumbar spine and contributes significantly to low back pain (Pan et al., 2006). Brenner asserts that she can palpate scars from C-sections and sense how they create postural stress by interrupting normal muscular support, afforded by a strong rectus abdominis (Brenner, n.d.).

Medici describes a cascade of postural adaptations that occur when lower abdominal support is lacking. As the lumbar plexus and sacral nerve plexus are compressed due to back-body adhesions and tension, the head moves forward, while the psoas shortens and the lumbar spine stiffens. The hips lose their seductive swinging motion while walking (Medici, 2014c). Hedley articulates that this is frequently perceived as part of the normal aging process, but “aging” happens in the fascia, and he and Hulme explain that when the body’s entire fasciae dehydrate with age and systemic inflammation, fascial fibers get increasingly adhesive (Hedley, 2005; Hulme, 2005). As fibrous bands of sticky, dried fascia begin to adhere to each other, the ease of slide and glide of muscle and connective tissue over bone diminishes (Findley, 2009; Hedley,

2005; James et al., 2009). Both Loupos and Hulme elaborate about how the perception of what constitutes a "normal" gait becomes more limited as overall flexibility begins to decrease (Hulme, 2005; Loupos, 2011).

Rolf implies that it is the adhesions within the fascia, which surround and separate the fibers of postural muscles, that determine the balance between physical structure and function (Rolf, 1977, 1989). According to Medici, these adhesions can be defined as a kind of systemic, active, self-propagating scar tissue. One's overall heath history, as well as one's history of physical injuries from surgeries and other physical traumas create these active scars, which are driven by chronic inflammation to exacerbate this process of gradual stiffening (Medici, 2015c). Findley and others indicate that both intra- and inter-muscular adhesions cause unfortunate postural shifts to take place over time (Findley & Schleip, 2007; James et al., 2009). Structural Integration therapists agree that the structural changes that result may take considerable effort to reverse (Bond, 2007; Hedley, 2005; Johnson, 1977; Myers, 2004b; Rolf, 1977; Schultz & Feitis, 1996).

Emotion: Scars and the Psychophysiology of Stress

While biochemical and biomechanical influences may seem more likely to cause sexual pain, emotional issues contribute as well. This section of the review of literature will present the research into how emotional stress contributes to sexual pain and the propagation of scar tissue. Research suggests that sexual pain will directly affect the relational and emotional life of a woman, particularly when it dampens her desire for sexual intimacy (Elmir, Schmied, Wilkes, & Jackson, 2010). Dramatic hormonal fluctuations during the postpartum period also affect a woman's emotions and levels of

sexual desire (Alder & Bancroft, 1988; Alder, Cook, Davidson, West, & Bancroft, 1986; Bancroft, 2005; Hipp, Kane Low, & van Anders, 2012).

Several articles point out that up-regulation of prolactin, a peptide hormone produced to ensure lactation, inhibits sexual impulses and desire while women are breastfeeding (Alder & Bancroft, 1988; Bancroft, 2005; Crenshaw, 1997). Medical research supports what women frequently report in online forums and blogs: Sexual desire is inhibited due to a combination of breastfeeding, attempting to meet the demands of the postpartum workload, dealing with a partner's sexual needs, and experiences of unremitting stress due to pain while healing from a birth-related injury (American College of Obstestricians and Gynecologists, 2016a; Hipp et al., 2012; Hyde, DeLamater, Plant, & Byrd, 1996; Signorello et al., 2001). It is suggested that a woman's lack of desire for sex will interfere with her relationship with her partner. This frequently manifests as a distinct aversion to sexual arousal and engagement, generally in favor of attention paid to the infant, who makes no sexual demands (Leeman & Rogers, 2012; Ohl, 2007; Signorello et al., 2001).

Sexual avoidance, reported to follow childbirth, is especially prevalent when giving birth has resulted in surgery, injury, or an emotionally traumatic outcome (Bailham & Joseph, 2003; Beck, 2004). Althof and others found that when penetrative sex with her partner becomes associated with pain, whether emotional or physical, women are likely to avoid it (Althof et al., 2005; Desrochers, Bergeron, Khalifé, Dupuis, & Jodoin, 2009). Ayers and her group agree that when sexual avoidance leads to relational stress, it adds to a woman's stress burden overall (Ayers, Joseph, McKenzie-McHarg, Slade, & Wijma, 2008).

When emotional stress is high, research suggests pain is more acutely experienced (Gouin & Kiecolt-Glaser, 2011; O'Sullivan & Beales, 2007). Research also reports that the increase in the expectation of pain, including the perception of sex as painful, adds to the complex array of stressors already at work in the postpartum period (Allen, 1998; Nicholls & Ayers, 2007). Bancroft's work on endocrinology and sexual arousal supports that a mother's physical exhaustion from night feedings, chores, and care for infant(s) every day contributes to adrenal depletion (Bancroft, 2005). Cortisol levels initially rise to meet the demands of the moment, and then drop overall once the adrenal glands become exhausted (Bancroft, 2005; Ehlert, Gaab, & Heinrichs, 2001; van Der Kolk & Saporta, 1991). Due to lactation demands and adrenal exhaustion, Heinrichs et al. verify that maternal cortisol levels drop (Heinrichs et al., 2001). In their physiology textbook, Guyton and Hall have written that cortisol is one of the body's anti-inflammatory compounds, and when it drops, inflammation increases and rages out of control, unopposed by adequate cortisol levels (Guyton & Hall, 2000). The work of Kiecolt-Glaser concurs that this is likely to cause systemic problems. These include interference with completion of wound healing, that according to Lewit, leads to the propagation of active scar tissue (Gouin & Kiecolt-Glaser, 2011; Kiecolt-Glaser et al., 2005; Kobesova & Lewit, 2000).

Bodnar and Wisner, and others have found that physical and nutritional depletion from pregnancy and also from the birth itself routinely go unaddressed for postpartum women, adding to stress on the mother's body (Bodnar & Wisner, 2005; King, 2003; Morell & Cowan, 2013). If stress is ongoing, the biochemical milieu in a woman's connective tissue matrix adapts, and Eming states that "inflammation has been shown to

delay healing and to result in increased scarring" (Eming et al., 2007, abstract). Corwin and Arbour concur, suggesting that unremitting stress of all kinds causes increased inflammation (Corwin & Arbour, 2007). In the next section, the literature about the chicken-and-egg relationship between emotional stressors, scar tissue, adhesions, and pain will be more deeply examined.

Childbirth and Post-Traumatic Stress Disorder (PTSD)

The history and study of the emotional consequences of a traumatic birth for the infant have been described in great detail (Emerson, 1987, 2002; Grof, 1985, 1988; Lake & Maret, 2009; Rank, 1929). Until recently, the study of the emotional experience of the mother while giving birth has gotten less attention. It is postulated that women whose own birth was traumatic are more likely to have a traumatic outcome when they themselves give birth (Emerson, 2002; Grof, 1976, 1985; Ward, 1987). Research over the last 10 years suggests that women with a history of past trauma, whether it is a history of physical abuse, sexual abuse, or neglect are more likely to have a traumatic birthing experience (Andersen, Melvaer, Videbech, Lamont, & Joergensen, 2012; Ayers, 2004; Beck, 2004; Crompton, 2002).

Childbirth has been reported to be a potentially overwhelming process with many possible outcomes for both mother and baby (Griebenow, 2006). One of these outcomes is the experience of trauma by the mother. The American Psychiatric Association's definition of trauma "involves experiencing or witnessing an event in which there is actual or perceived death or serious injury or threat to the physical integrity of self or others, and/or the person's response included fear, helplessness, or horror" (Simkin, 2011, p. 167). Many researchers report that when a woman feels overwhelmed and

powerless to change her circumstances during a difficult childbirth, the experience of trauma, along with its emotional and physical sequelae, often results (Ayers, 2004; Crompton, 2002; Elmir et al., 2010; Simkin, 2011).

Research suggests that women who have experienced severe trauma while giving birth are likely to exhibit classic symptoms of PTSD, including nightmares, flashbacks, dissociation, and an exaggerated startle response that does not resolve within the first 6 months postpartum (D'Andrea, Sharma, Zelechoski, & Spinazzola, 2011; Jukelevics, 2014). Alappattu and Bishop report that these symptoms, in combination with sexual avoidance due to painful scar tissue, can have a devastating effect on a woman's physical experience and emotional life (Alappattu & Bishop, 2011). Many researchers agree that a woman's most important relationships, including her vital relationships with her partner and her children will be affected (Ayers et al., 2008; Bailham & Joseph, 2003; Elmir et al., 2010). Research into wound repair has found that the resulting increase in emotional stress levels will increase the genetic propagation of inflammation itself (Gouin & Kiecolt-Glaser, 2011). Ample research supports that an internal inflammatory environment exacerbates the growth of fibrotic, active scar tissue (Eming et al., 2007; Gouin & Kiecolt-Glaser, 2011; Powell et al., 2013).

According to Ayers and Pickering, PTSD was added to the third edition of the Diagnostic and Statistics Manual (DSM-III) in 1980 (Ayers & Pickering, 2001). This was a response to physically wounded and emotionally traumatized veterans returning home from the war in Vietnam (Dugan, 2010). In 1995, the criteria for PTSD were redefined in the fourth edition of the DSM. Ayers & Pickering suggest that these expanded criteria included many characteristics common to childbirth (Ayers & Pickering, 2001).

The literature lists a range of prevalence of birth-related PTSD, as between 1.7% and 9% of all births (Alcorn, O'Donovan, Patrick, Creedy, & Devilly, 2010; Ayers et al., 2008; Simkin, 2011). Ayers and Ford suggest there is a significant overlap between birth-related PTSD and postpartum depression, but that PTSD has distinct symptoms, including flashbacks, nightmares, and dissociative and/or avoidant behavior (Ayers & Ford, 2009). Alcorn's group submits that women who met the criteria for PTSD had inevitably had a harrowing birth experience (Alcorn et al., 2010).

A review of post-traumatic stress after childbirth stated that diagnosis of birth-related PTSD has been increasingly noted in the literature since the early 1990s, due to changes in the criteria for PTSD in the DSM-IV. However, symptomology of birth-related PTSD was reported much earlier and published in the early the 1970s (Arizmendi & Affonso, 1987; Bailham & Joseph, 2003). According to Bailham and Joseph, the increase in birth-related PTSD symptomology was due to changes in birthing practices, as women embraced more natural approaches to childbirth. According to Devitt, from the 1930s through the 1960s, the use of scopolamine and other mind-altering drugs was part of an anesthetic cocktail given to ease pain during labor, which induced a state of "twilight sleep" in women giving birth (Devitt, 1977). Several researchers relay that women who gave birth during this period reported "missing pieces" of their labor and delivery experience due to the dampening effect of scopolamine on memory (Hasselmo & Wyble, 1997; Stolte, 1986). Stolte notes that as the natural childbirth movement began to gain popularity in the 1970s, birth practices changed, and these drugs were used less frequently. Stolte elaborates that in the case of difficult hospital births, because women could remember more about their birth, traumatic memories as well as PTSD symptoms

became more commonly reported, resulting from these birth practice and policy changes (Stolte, 1986).

> The diagnostic criteria for PTSD are divided into three groups, and include: (1) re-experiencing of the traumatic event including intrusions, dreams and re-experiencing emotions associated with the trauma; (2) Avoidance [sic] of stimuli associated with the trauma and numbing of emotional responsiveness e.g. [sic] avoiding thoughts and feelings about the trauma, avoiding activities associated with the trauma, and emotional changes such as detachment from others; (3) symptoms of hyperarousal such as difficulty sleeping, concentrating, irritability, and excessive startle responses (Bailham & Joseph, 2003, p. 160).

A common thread in the literature about birth-related PTSD is that "trauma is in the eye of the beholder" (Beck, 2004, p. 217). Beck explains what this phrase means is that when the mother feels her birth was traumatic, is *has* been, at least to her. Many researchers suggest that birth professionals, from doctors and nurses to midwives and doulas have been witness to a broad variety of birth experiences, and what to their experienced eye seems routine may seem outrageous, frightening, and disempowering to a birthing woman, particularly to a first-time mother (Beck, 2004, 2005; Goer, 2010; Griebenow, 2006; Kudeva, 2015; Simkin, 1991, 1992b).

Van der Kolk has stated that when anyone feels powerless, hopeless, and helpless, a trauma response is common (van der Kolk, 2006). Both Simkin and Goer report that women often feel unseen and unheard in their requests for food, drink, changes in their pain medication, and adjustments in their body position during labor (Goer, 2010; Simkin, 1992b, 2011). Some of the predictors of what magnifies a birth-related trauma

response into full-blown PTSD are reported to include a history of prior trauma, poor labor support, negative emotions during labor, a sense of loss of control, and emergency C-section (Allen, 1998; Andersen et al., 2012; Bailham & Joseph, 2003; Fairbrother & Woody, 2007; Ryding, Wijma, & Wijma, 1997). Many researchers note that the most important predictors for PTSD are states of hopelessness and helplessness (Ayers, 2007; Braš, Đorđević, Gregurek, & Bulajić, 2010; Crompton, 2002; Simkin, 2011).

Examples of women's experience of birth-related PTSD are reported to vary widely (Beck, 2004). Simkin and others have recounted how women with birth-related PTSD have experienced excruciating pain due to insufficient anesthesia during C-section and have a perception of cruel or dismissive treatment by midwives, doctors, and nurses in both home birth and hospital settings (Arms, 1994; Crompton, 2002; Davis-Floyd, 2001; Simkin, 2011). Anthropologist and birth activist Robbie Davis-Floyd suggests that the technocratic culture now common to managed care in Western medicine, and especially so in hospital environments, prevents the development of an empathetic relationship between doctor and patient:

> The warm exchange of breath and sweat, of touch and gaze, of body oils and emotions, that characterizes birth in which there is an intimate connection between the mother and her caretaker, has given way in the United States to the cool penetration of needles, the distant interpretation of lines on a graph. (Davis-Floyd & Davis, 1996, p. 238)

Another reported symptom of PTSD is the mother's reliving of past experiences of sexual abuse while in labor (Crompton, 2002; Seng, Low, Sparbel, & Killion, 2004). Crompton and Bailham and Joseph have hypothesized that the inability to cope with the

intense autonomic changes and other stresses of labor becomes a trigger for past sexual abuse memories. Additionally, they suggest that use of unskilled touch without consent by doctors, nurses, and midwives is also reported to trigger abuse memories (Bailham & Joseph, 2003; Crompton, 2002).

Women express common themes of PTSD, and research has identified these themes to include prolonged periods of helplessness/hopelessness, combined with the belief that their pain is life threatening. Goodman's group discusses that when a woman experiences a feeling of a total loss of control while giving birth, this results in feeling powerlessness in her ability to birth her baby; maternal defeat is one outcome (Goodman, Mackey, & Tavakoli, 2004). Maternal defeat is defined by Simkin, and by Ayers, as the mother giving up due to a sense of personal failure and exhaustion (Ayers, 2004; Ayers & Pickering, 2001; Simkin, 2011).

The physiology of stress has been well studied since the 1950s, and its negative effects on immune function, epigenetics, and emotional stability are well known (Lipton, 2005; McEwen & Lasley, 2002; Selye, 1978; van der Kolk, 2006, 2014). The study of the psychophysiology of PTSD suggests that PTSD "involves a fundamental dysregulation of arousal modulation at the brain stem level. PTSD patients suffer from baseline autonomic hyperarousal and lower resting HRV [heart rate variability] compared to controls, suggesting that they have increased sympathetic and decreased parasympathetic tone" (van der Kolk, 2006, p. 9).

Research suggests that prolonged stress, including PTSD produced by a traumatic childbirth experience, will affect female sexual function (Basson, 2002; Beck, 2004; Berman, 2005; Park et al., 1997). Park et al., describe how sympathetic and

parasympathetic nerves pass through the uterovaginal plexus, going to the vagina, and that vascular delivery to the genitals, which ensures both engorgement and lubrication, is affected by autonomic balance (Meston & Gorzalka, 1995; Park et al., 1997). Medici and Schleip suggest that autonomic balance affects vascular delivery to, and behavior of, smooth muscle cells as well as endocrine/sexual function (Medici, 2016a; Schleip et al., 2006).

While Meston and Gazalka maintain that sympathetic arousal from exercise shows a beneficial role in facilitating female sexual arousal, the effects of chronic sympathetic up-regulation due to anxiety caused by painful sex, and how they affect normal arousal, engorgement and lubrication functions of these tissues has not been described in detail (Jannini, d'Amati, & Lenzi, 2006; Leeman & Rogers, 2012; Meston & Gorzalka, 1995; Park et al., 1997). What has been studied in detail is how women respond to sexual situations after major trauma from birth-related injuries:

> Women with major trauma (defined as second-degree or greater lacerations or first-degree lacerations that required suturing) did have significantly less desire to be held, touched, or stroked by their partner than did women with minor trauma (women without trauma or first-degree trauma). (Leeman & Rogers, 2012, p. 650)

Traumatic Spectrum Response (TSR), and Post-traumatic Stress Effect (PTSE)

According to both Simkin and Beck, while the overall prevalence of diagnosed birth-related PTSD affects between 1.7% and 9% of all women, many more women report a significantly higher incidence of traumatic events that do not meet all DSM-IV criteria required for a PTSD diagnosis (Beck, 2004; Simkin, 2011). Birth related trauma that falls short of a full PTSD diagnosis has been called a traumatic spectrum response

(TRS), or posttraumatic stress effect (PTSE) (Osuch & Engel Jr, 2004). In one prospective longitudinal study, 45% of women reported "a 'traumatic' birth event, at 4–6 weeks post-partum, using the DSM-IV-TR criteria" (Alcorn et al., 2010, p. 1852).

To receive a clinical diagnosis of PTSD, researchers report that women who have had a traumatic childbirth must fulfill multiple criteria across each of three categories in the DSM-IV (Alcorn et al., 2010; Andersen et al., 2012). According to Ayers and others, women's self-reports that their birth was traumatic, range from 30 to 45% (Ayers, 2004; Ayers et al., 2008; Beck, 2004; Simkin, 2011). Alcorn's group found that the highest incidence of traumatic birth reports seems to peak between 4 weeks and 3 months postpartum, with lower incidences of trauma reports occurring as time passes (Alcorn et al., 2010).

Traumatic spectrum responses related to childbirth vary widely from study to study. There are many factors that contribute to a trauma spectrum response, including psychosocial factors such as anxiety, depression, poor coping skills, and low levels of birth support (Ayers, 2004; Crompton, 2002; Fairbrother & Woody, 2007; Söderquist, Wijma, Thorbert, & Wijma, 2009). Factors that are most frequently associated with a trauma response are helplessness and overwhelm (Braš et al., 2010; Eichler, 2012; Elklit & Brink, 2004). A history of childhood abuse and/or neglect is suggested as a predictor for a trauma response to childbirth. "Psychic trauma results when an individual experiences an adverse event which causes undue stress which is perceived to be beyond their control. When the event is unforseen [sic] and happens quickly, such as obstetric emergency, it can be overwhelming" (Crompton, 2002, para 20).

Birth scenarios reported to be most closely associated with women's perception of a traumatic birth outcome include fear of childbirth, first pregnancy, high levels of obstetric intervention, emergency C-section, and prior trauma, including a history of sexual abuse (Beck, 2004; Crompton, 2002; Fairbrother & Woody, 2007; Söderquist et al., 2009). Although a large percentage of women report trauma responses to childbirth, particularly in the 6 months after birth, it has been reported that a majority of women are likely to recover from this condition spontaneously (Ayers, Claypool, & Eagle, 2006; Jakovljević, Brajković, Lončar, & Čima, 2012; Simkin, 2011; Yehuda & Bierer, 2009).

Many studies of birth-related PTSD make the conclusion that early trauma is a predictor of PTSD during childbirth (Allen, 1998; D'Andrea et al., 2011; Seng et al., 2004). Alcorn's group found that occurrence rates for PTSD *before* childbirth map closely onto the incidence rate of PTSD resulting *from* childbirth (Alcorn et al., 2010). That is not to say that all women who experience PTSD have had a history of abuse, neglect, or other trauma, but early trauma was found to be an important predisposing factor for birth-related PTSD (Jukelevics, 2014; Söderquist et al., 2009).

Sexual Abuse

Sexual abuse is closely linked with trauma spectrum responses in a large variety of cases, including those outside the realm of childbirth (Carlier et al., 2013; Scaer, 2005; van der Kolk, 2006). While the true incidence of sexual abuse is debated, many studies estimate that between one in three and one in five women has been subjected to some form of sexual abuse or sexual assault during her lifetime (Crompton, 2002; Leserman, 2005; Stoltenborgh, Van Ijzendoorn, Euser, & Bakermans-Kranenburg, 2011). The true prevalence of sexual abuse and trauma is reported to be difficult to pinpoint. Research

reports many mediating factors, making these experiences difficult to categorize (Leserman, 2005; Stoltenborgh et al., 2011). However, researchers have found strong statistical relationships between PTSD, sexual abuse and chronic pelvic pain (Heim, Ehlert, Hanker, & Hellhammer, 1998; Pastore & Katzman, 2012; Walling et al., 1994).

Dysregulation of the hypothalamic-adrenal-pituitary (HPA) axis, found to be common to abuse survivors, is reported to be more easily triggered during stressful events such as childbirth (Anda et al., 2006; Heim et al., 1998). Anda et al. and Andersen's group suggest that the sense of violation experienced as a child during an early experience of sexual abuse may be unintentionally initiated when a birth attendant gives a routine cervical exam during the process of labor (Anda et al., 2006; Andersen et al., 2012). Simkin suggests this occurrence is more likely if the birth attendant is not aware of the abuse history of the birthing woman (Simkin, 2011). This problem is not easily addressed, and it is reported that memories of sexual abuse may be sublimated, and not arise until the laboring woman has been touched in a way she finds triggering (Crompton, 2002; Nijenhuis, van Engen, Kusters, & van der Hart, 2001).

Anda et al. and others suggest that organic changes in brain function as a result of early trauma will predispose an abuse survivor to recapitulate a trauma response or PTSD symptoms (Anda et al., 2006; D'Andrea et al., 2011; van der Kolk, 2006). When faced with the unknown outcome of childbirth, a lack of sufficient support, and feelings of being out of control during the demands of labor, trauma research suggests that a sexual abuse survivor may not be able to separate the present from the past and gets dragged into a vortex of fear and resignation (Courtois & Riley, 1992; Kalsched, 1996). This is the ground from which maternal defeat reportedly arises and may strongly predispose the

woman to postpartum depression (Crompton, 2002; Simkin, 2011). New research has suggested that depression is now strongly associated with inflammation (Kendall-Tackett, 2007; Raison, Felger, & Miller, 2013). This dissertation has documented that inflammation contributes to the propagation of scar tissue.

Emotional Abuse, Physical Abuse, and Neglect

D'Andrea's group reports that over 50% of women note experiencing at least one traumatic event in their lives (D'Andrea et al., 2011). These events may include physical abuse, emotional abuse, or neglect. Van der Kolk has written that the exposure to early trauma has an impact on one's later experience of anxiety, depression, and panic disorders (van der Kolk, 2014). Anda et al. and McEwan each suggest that there are many other negative health consequences caused by a stressful or traumatic past that make chronic physical illness, such as diabetes, metabolic syndrome, chronic fatigue, fibromyalgia, and heart disease more likely to occur (Anda et al., 2006; McEwen & Lasley, 2002). According to research from the Harvard School for Public Health, these conditions have been shown to create or intensify inflammation throughout the body, and McFarlane contributes that this is especially so when there is a history of trauma (Harvard T. H. Chan School of Public Health, 2016; McFarlane, 2010).

Courtois and Riley suggest that abuse survivors are more likely to be alienated from their bodies due to dissociation (Courtois & Riley, 1992). They are also more likely to pursue drug addiction, suicide attempts, and have depressive disorders, according to Anda's group (Anda et al., 2006). This is significant because each of these behaviors may result in the accumulation of injuries, which will likely result in scar tissue formation. It has been suggested by Anda's group that a number of emotional and physical

comorbidities run parallel with the exposure to repeated adverse childhood experiences (Anda et al., 2006). Exposure to early trauma may also impact the ability to form close long-term relationships; according to Essex and her group, this can set up conditions for additional marital stress (Essex, Klein, Cho, & Kalin, 2002).

Domestic Stress, Inflammation, and Scars

In the first chapter of this dissertation, it was shown that the proliferation of active scars due to inflammation represents an ongoing process. Earlier in this section, we saw how the avoidance of sexual relating due to painful scar tissue will affect the quality of a woman's intimate relationship(s). Awada's group and Alappattu and Bishop conclude that this can affect a woman's overall emotional life (Alappattu & Bishop, 2011; Awada, Bergeron, Steben, Hainault, & McDuff, 2014). Conversely, research substantiates that stress in the emotional life of a woman will influence the quantity and quality of her pain, whether due to scars or other causes (Bauman, 2013; Savidge & Slade, 1997).

Ayers and Ford and Bailham and Joseph report that avoidant behavior is one of the most frequent outcomes of PTSD (Ayers & Ford, 2009; Bailham & Joseph, 2003). Sexual avoidance is reportedly common among women with sexual pain, as well as women who meet the criteria for birth-related PTSD (Beck, 2004; Desrochers et al., 2009). Women may feel frightened and/or unwilling to engage in the act that produced their traumatic experience of birth (Alappattu & Bishop, 2011; D'Andrea et al., 2011). Researchers agree that women may often feel triggered by genital contact, vaginal penetration, or even close physical contact with their partner (Ayers & Ford, 2009; Bailham & Joseph, 2003; O'Driscoll, 1994).

Research has established that PTSD can lead to ongoing stress that resists resolution without skilled intervention (Cloitre et al., 2011). There is ample evidence that traumatically induced stress produces high levels of stress hormones that are destructive to immunological and metabolic functions (Cohen, Perel, DeBellis, Friedman, & Putnam, 2002; McFarlane, 2010; Osuch & Engel Jr, 2004). When there is ongoing stress, such as relational stress that accompanies birth-related PTSD, there are also important changes in genetic activity. This research suggests that as they react to stressors, genes will prime certain immune system cells to fight an inflammatory process that does not actually exist (Caldwell, 2013; Powell et al., 2013).

Powell's research indicates that when there is unchecked inflammation, without an infection to fight or an injury to heal, the expression of pro-inflammatory genes will affect physiological function, which includes the intercellular milieu of the ECM. Research supports that the production of pro-inflammatory compounds will up-regulate inflammation in the ECM, and promote ongoing formation of active scar tissue, including ongoing overproduction of collagen (Eming et al., 2007; Martin & Leibovich, 2005; Rodríguez & del Río, 2013).

If couples are stressed and bickering about sex or the lack of it in the postpartum period, the bickering in and of itself has been shown to negatively affect wound healing. In a study reported in the *Journal of the American Medical Association* (JAMA), researchers stated that "a series of studies have shown that marital conflict alters physiological functioning, and hostile behavior, particularly during conflict, markedly enhances adverse physiological changes; moreover, women appear to be more adversely affected than men" (Kiecolt-Glaser et al., 2005, para 4). This study found that wound

healing took longer in high-conflict couples, and that increases in inflammatory cytokines were significant and could possibly be linked to depressive symptomology.

The literature reviewed in this section supports that multiple stressors, including emotional trauma held in the body affects scar tissue propagation and its resultant pain through numerous mechanisms. Emotional trauma has been described as leading to patterns of muscular tension, which also become chronic (Hulme, 2005; Keleman, 1985; Loupos, 2011; Rolf, 1977; Schultz & Feitis, 1996). These changes have been reported to result in the sensitization of nerves due to increased inflammation (Braš et al., 2010; Crompton, 2002; Gouin & Kiecolt-Glaser, 2011; Kiecolt-Glaser et al., 2005). Bauman, Butrick, Weiss, and others have indicated that nerve sensitization in the pelvic floor related to emotional stress contributes to painful sex (Bauman, 2013; Butrick, 2007; Fry, Crisp, & Beard, 1997; Weiss, 2001).

Scars, Sexual Desire, and Physiology

The problems of sexual dysfunction and low sexual desire in women have been examined in great detail. Low sexual desire has been ascribed to many causes, including pain resulting from penetration and occasionally from sexual arousal itself, but low sexual desire is rarely acknowledged as a direct result of scar tissue. This section examines how scar tissue affects sexual function, leading to low sexual desire.

There are contrasting definitions of what constitutes female sexual dysfunction (FSD), and much controversy surrounds these definitions (Basson et al., 2000; Binik, Brotto, Graham, & Segraves, 2010; Moynihan & Cassels, 2006; Tiefer, 2004b). According to Moynihan's critical review in the *British Medical Journal*, the promise of a drug-mediated intervention that could reliably increase female sexual desire and arousal

spawned substantial funding and research (Moynihan, 2003; Moynihan & Cassels, 2006; Tiefer, 2006). Moynihan, Tiefer, Basson, and others consequently published abundant critique, much of it focused on the medicalization of women's sexuality (Basson, 2002; Moynihan & Cassels, 2006; Tiefer, 2004a, 2004b). In one such critical article, Basson suggested that the predominant paradigm for evaluation of female sexual response and desire misunderstood women's lived experience. She suggested that re-contextualization of the elements that create desire for women was in order:

> The traditional model [of female sexuality] does not include intimacy or stimuli nor does it show that the motivational force for women is very fragile and influenced, in turn, by the sexual experience itself. Thus, the components of the cycle that may foster a desire disorder include the level of emotional intimacy with the partner, the types of stimuli and their context, environmental triggers, and a large number of psychological and poorly understood biological factors allowing or disallowing arousal. (Basson, 2002, p. 18)

One possible biological factor that remains poorly understood is the incursion and effects of scar tissue, in ways that are outlined below.

In a group report from the International Consensus Development Conference on Female Sexual Dysfunction, Basson et al. noted that FSD was "highly prevalent, but not well defined or understood" (Basson, 2002, abstract). Further, this report noted differences in definitions between the World Health Organization's International Classifications of Diseases (ICD-10), and the fourth edition of the Diagnostic and Statistics Manual (DSM-IV). Despite differing definitions of FSD, Basson and her group stated that both the ICD-10 and DSM-IV "rely heavily on the human sexual response

cycle model first described by Masters and Johnson, and later elaborated on by Kaplan" (Basson et al., 2000, p. 889). In 1966, Masters and Johnson developed their linear four-phase model of human sexual response (Masters & Johnson, 1966). In their well-known model, they included excitation, plateau, orgasm, and resolution as the phases of sexual response (Masters & Johnson, 1966). Levin and Robinson report that later, the plateau phase was eliminated as a distinct entity, after having been collapsed into the late excitation phase (Levin, 2002; Robinson, 1976). This reduced the four-phase model to three phases: excitation, orgasm, and resolution.

Levin reports that by the late 1970s, Kaplan expanded the three-phase model of arousal to include the element of desire (Kaplan, 1977, 1995; Levin, 2002). In his report, Levin noted that Kaplan's work found that desire was a necessary precursor for the transition from no arousal to sexual arousal, and was presumed to precede the excitation phase (Levin, 2002). Kaplan, who was writing extensively about problems of low sexual desire at that time, described several essential physical prerequisites for the experience of desire:

> Many lines of evidence have established beyond question that the experience of sexual desire and the normal regulation of sexual motivation require that the neurological substrate that transmutes the perception or fantasy of an attractive sexual partner into subjective feelings of sexual lust must be anatomically intact and supplied with a normal complement of hormones and neurotransmitters. (Kaplan, 1995, p. 266)

In this quotation, Kaplan makes an elegant connection between the emotional and physiologic bodies. Kaplan's concept of the neurological substrate provides the ground

for sexual arousal; without it, sex may remain merely a good idea in fantasy (Kaplan, 1995). However, research by the Wurns, their colleagues, and others has suggested that without the emergence of physical excitement, engorgement, and the lubrication produced during full arousal, sexual contact will be uncomfortable for many women (Levin, 2002; Wurn et al., 2009; Wurn et al., 2004). Basson comments that:

> In women, an accurate awareness of genital engorgement usually is lacking, so this direct confirmatory stimulus is absent. Indirect confirmation is possible through increasingly intense sexual pleasure derived from repeated, direct genital stimulation. However, the woman or partner may not be aware that her erectile tissue is not only in the shaft and body of the clitoris but extends deeply in the vulva under the labia and the superficial perineal muscles, and, variably, around the urethra. (Basson, 2002, p. 19)

After Kaplan's work it took another 20 years, according to Nappi et al., to substantiate and describe the physiology of each of the prerequisites for desire and arousal named by Kaplan in 1995 (Nappi et al., 2005). Nappi's group describes an international meeting convened in Paris in 2003 to define each of the components of women's sexual desire and/or dysfunction. An alliance of urologic and sexual medicine societies convened, including over 200 multidisciplinary specialists from 60 countries, who broke into various consultation committees. They found that, "[t]hree critical physiologic requirements, including intact sex steroids, autonomic/somatic nerves, and arterial inflow/perfusion to women's genital organs play fundamental roles in maintaining women's sexual function" (abstract).

The Wurns claim that each of these critical physiologic aspects of desire may be impaired or interrupted by the presence of scar tissue (Wurn et al., 2009). Graziottin and Giraldi further point out that Kaplan's "neurological substrate" may become impinged or cut through by surgical interventions during childbirth or other procedures (Graziottin & Giraldi, 2006). Levin, the Wurns, and the Federation for Feminist Women's Health Clinics suggest that the genital bodies themselves, which include the clitoris and its hood, the vestibular bulbs, and perineal sponge, and paraurethral ducts and glands may no longer be intact, or may be adhered to surrounding tissues, or to each other after receiving such surgical interventions (Federation of Feminist Women's Health Centers, 1991; Levin, 2002; Wurn et al., 2009; Wurn et al., 2011).

According to Gruenwald and his group, "[a] normal sexual response in the female depends on the integrity of afferent sensory input from the genital region" (Gruenwald et al., 2007, abstract). They imply that each tissue that produces these chemicals must be whole and functioning to reach the point in a sexual trajectory for the necessary chemical cascade of arousal to be catalyzed. The Wurns concur, adding that with nerves severed or impinged and genital anatomy scarred, numb or painful, the production of a normal complement of hormones, peptides, and neurotransmitters will be interrupted (Wurn et al., 2009; Wurn et al., 2011). All of these elements, which have been described as necessary to produce desire, as well as others not noted by Kaplan, will be described in relationship to the updated four-phase model of human sexual response initially created by Masters and Johnson.

From Desire to Early Arousal: Engorgement

In the definition of female anatomy and genital function on their website, the Boston University Medical Center states that, in the transition from desire to early arousal, sexual cues are perceived, arousal responses are initiated, and numerous chemical and neurological connections between the nervous system and genitals get activated (Boston University School of Sexual Medicine, 2002). Others agree with this description (Basson, 2002; Fields, 2007; Wimpissinger, Stifter, Grin, & Stackl, 2007). In addition to Komisaruk and his group, Levin describes how nerves in the pelvic floor initiate spinal reflexes, which refer neural impulses to the brain (Komisaruk, Beyer-Flores, & Whipple, 2006; Levin, 2002). This in turn initiates many levels of physiologic response: the heart speeds up, respiration increases, and blood pressure increases. These responses are associated with an up-regulation of sympathetic cues from the autonomic nervous system and propagated through the central nervous system (Guyton & Hall, 2000; Selye, 1978).

Medici has described how an exquisite balance and perfectly coordinated transition from sympathetic to parasympathetic dominance is required to initiate early sexual arousal and engorgement (Medici, 2015a, 2016b). A variety of experts on sexual physiology describe how, as vasodilation occurs in the pelvic floor, the increase in blood pressure contributes to the process of initial genital engorgement (Graziottin & Giraldi, 2006; Gruenwald et al., 2007; Levin, 2002). Both Winston and Gage have drawn and captioned illustrations showing that as vasodilation occurs, blood is pushed into the clitoral shaft, glans, and legs, as well as into the labia minora, vestibular bulbs, and

perineal sponge on the vaginal floor (Federation of Feminist Women's Health Centers, 1991; Winston, 2010).

Popular guides to women's sexuality illustrate that beds of erectile tissue surround the introitus, ensuring a snug fit when sufficiently engorged (Chalker & Fish, 2002; Federation of Feminist Women's Health Centers, 1991; Winston, 2010). Vasodilation and the consequent engorgement of genital capillary beds enable secretions of slick lubricating fluid, which is mediated mainly by the parasympathetic nervous system (Graziottin & Giraldi, 2006; Pasqualotto et al., 2005). Graziottin and Giraldi note that "[r]etracting scars from episiotomy/rraphy, vestibulectomy or perineal surgery may be associated to vaginal dryness, acquired genital arousal difficulties and acquired introital dyspareunia, as pain is the strongest reflex inhibitor of vaginal lubrication" (Graziottin & Giraldi, 2006, p. 8).

When pelvic floor trauma occurs during surgery, research has found that tearing and overstretching of genital nerves also occurs, and these nerves become damaged, cut, or compressed (Goldberg, 2007; İnan et al., 2015; Wurn et al., 2011). Engeler et al. and Rosenbaum suggest that this leads to a general relaxation of the muscles of the pelvic floor, which reduces sensation for both sexual partners (Engeler et al., 2013; Rosenbaum, 2007). Conversely, doctors and physical therapists find that chronic muscular tension, associated with emotional stress due to pain, adds to ischemia and inflammation promoting scar tissue formation (Rosenbaum, 2008; Weiss, 2003; Wurn et al., 2011).

According to Rolf and her students, ischemia leads to the incursion of scar tissue (Johnson, 1977; Rolf, 1989). Pelvic pain and nerve specialists have noted that both severe and chronic nerve impingement will cause nerve damage (Perl & Graham-Kenan, 1993;

Prendergast & Weiss, 2003; Weiss, 2003; Wise & Anderson, 2010). Gruenwald and his group reiterate that damaged nerves cannot initiate the complex communication chain between the pelvic floor, spinal cord, and brain structures required to initiate a woman's desire and arousal trajectory (Gruenwald et al., 2007).

In 1949, Donald Hebb published *The Organization of Behavior*, in which he proposed that neurons that were activated simultaneously would, over time, become linked to each other so that when any one of them was activated, the others were activated as well (Brown & Milner, 2003; Hebb, 1949). The introduction to Hebb's book is described by Rumelhart, Hinton, and Williams (1989) as "a brief and lucid discussion of the connection between psychology and physiology and has not dated one bit between 1949 and now" (p.43). The modern version of Hebb's axiom is typically paraphrased as "neurons that fire together, wire together" (Doidge, 2013; Ostrow, 2014; Shatz, 1996).

Kramer teaches that our sexual memories originate from our sexual experiences, and that this is important because the body learns about sex from the physical experience of it (Kramer, 2011). While Kramer maintains that people learn about sex from experience, others have written that women who have painful sex after childbirth learn to link sex with pain (Alappattu & Bishop, 2011; Althof et al., 2005). Sexual physiologists suggest that when parasympathetic nerves cannot respond normally to sexual stimuli due to anxiety, healthy sexual arousal cannot initiate (Graziottin & Giraldi, 2006; Pasqualotto et al., 2005).

Sexual physiology research suggests that as women learn sex is painful, it causes anxiety to link to sexual activity, recalling Hebb's axiom (Desrochers et al., 2009). Abundant trauma research suggests that habitual stress responses may become deeply

wired to painful sexual experiences from the past (Butler & Matheson, 2000; Haines, 1999; Levine, 2010; LoFrisco, 2011; Minton et al., 2006; Scaer, 2001; van der Kolk, 2014; Wise & Anderson, 2010). When this happens, according to Bradford, Meston, and others, novel incoming sexual signals become re-interpreted as stressful rather than inviting (Bradford & Meston, 2006; McEwen & Lasley, 2002; Scaer, 2005). The work of Pasqualotto and Graziottin implies that without the ability to relax, parasympathetic engagement, so necessary to transition from desire to engorgement and lubrication, will not occur (Graziottin & Giraldi, 2006; Pasqualotto et al., 2005).

Excitation: Three Phases of Lubrication

In the arousal model articulated by Masters and Johnson, a normal sexual trajectory moves from desire to excitation, assuming that after initial desire and early sympathetic arousal, sexual stimulation continues (Masters & Johnson, 1966). Research supports that when this communication chain has been successfully primed, the engorgement process will then drive lubrication up from vascular sources to the genital surface as autonomic balance swings from sympathetic to parasympathetic (Boston University School of Sexual Medicine, 2002; Komisaruk et al., 2006b).

Research in women's sexual physiology describes how vaginal nerve endings produce the release of vasoactive intestinal peptide (VIP), which is considered "the most important neurotransmitter in the regulation of vaginal blood flow" (Graziottin & Giraldi, 2006, p. 19). Slick fluid is pushed up onto the mucosal surface of the vulva and into the vaginal canal as a result of the engorgement process, mediated by this crucial neurotransmitter (Graziottin & Giraldi, 2006; Komisaruk et al., 2006b). This resulting fluid is called vaginal transudate, which is formed partially from blood plasma that filters

through to the vaginal mucosa from pelvic floor capillary beds. VIP in combination with parasympathetic nerve impulses drives the rapid expansion of blood delivery. The blood then becomes trapped in specialized capillaries, building up pressure and driving fluid movement to the mucosal surface as the capillaries expand (Graziottin & Giraldi, 2006; Winston, 2010).

Researchers and sex educators agree that if there is an accumulation of scar tissue in the genitals and pelvic floor, it will interfere with vascular dilation by blocking blood flow into these tiny, specialized erectile capillary beds (İnan et al., 2015; S. Winston, personal communication, August 2010). Bo and Sherburn suggest that pelvic floor nerves are constricted, impinged, or injured as a result of birth-related injury (Bo & Sherbourne, 2005). The production of VIP and other neurotransmitters may become inhibited as a result of nerve damage. Research has found that a lack of lubrication is associated with dyspareunia, particularly after childbirth (Kettle, Ismail, & O'Mahony, 2005; Kramp, 2012). Frohlich and Meston have indicated that without sufficient vasodilation, lubrication will be restricted, and Kaplan reiterates that sexual intercourse without adequate lubrication is painful, and will affect sexual desire (Frohlich & Meston, 2000; Kaplan, 1995).

> The friction produced by the penis as it rubs against the tight, dry, and more friable vaginal mucosa often produces irritations, erosions, and even frank lesions of the vaginal tissues. Traumatic genital lesions are common in women who engage in vigorous coitus, especially if no lubricants are used. These vagina lesions can be severe enough to preclude intercourse and lead to a loss of desire for sex. (Kaplan, 1995, p. 268)

Berman and her group describe how during sexual excitation, venous and lymphatic drainage is constricted, keeping vaginal transudate (lubrication) from being reabsorbed by the vulvar mucosal surfaces (Berman, Berman, Werbin, & Goldstein, 1999). Boston University Medical Center has suggested that this slippery lubricant allows for painless penetration when it is in sufficient supply (Boston University School of Sexual Medicine, 2002). In their book *The Science of Orgasm*, Komisurak, Beyer-Flores and Whipple document that neuropeptides such as peptide Y and nitric oxide modulate the erectile capacity of the clitoris, vestibular bulbs, and the perineal sponge (Komisaruk et al., 2006b). As these erectile tissue beds engorge, they promote what Taoists term the first phase, or "first water" of genital lubrication due to the displacement of fluids from their capillary beds onto the mucosal surfaces of the vulva and vagina (Chia, 1986; Douglas & Slinger, 1979).

In *A New View of a Woman's Body* (Federation of Feminist Women's Health Centers. 1991), illustrations demonstrate how, in addition to the swelling of capillary erectile tissue beds that create a coat of vaginal sweat, the Bartholin's (vulvovaginal) glands also contribute to vaginal lubrication. These drawings indicate that the Bartholin's glands are squeezed, or milked, by the swelling of the surrounding vasculature of the vestibular bulbs as they become engorged. Levin reports that Kinsey et al. (1953) declared that the viscous output of the Bartholin's glands is thicker and slicker than the initial vaginal transudate (Kinsey, Pomeroy, Martin, & Gebhard, 1953; Levin, 2002). This is referred to as "yin essence" in Taoist sexual texts (Chia, 1986; Douglas & Slinger, 1979). The work of both Kinsey and the FFWHC suggests complete engorgement of all surrounding vasculature is required to compress the Bartholin's glands, and a high

threshold of arousal must be attained in order for their fluid to be released (Federation of Feminist Women's Health Centers, 1991; Janssen, 2007; Kinsey & Research, 1953).

According to Zaviačič and others, the female prostate (G-spot area) is located around the urethra, immediately above the top surface of the vaginal vault (Sundahl, 2003; Winston, 2010; Zaviačič, Jakubovská, Belosovic, & Breza, 2000). Sundahl's book *Female Ejaculation and the G-spot* describes how this area becomes enlarged and firmer as it engorges (Sundahl, 2003). Engorgement of the G-spot area occurs when plasma gets pushed from specialized erectile capillary beds into prostatic glandular tissues surrounding the urethra according to Winston (2010). Zaviačič, Sundahl, and others report that plasma collects in this tissue until it is expelled as ejaculate during orgasmic response due to localized pressure, relaxation of tiny paraurethral sphincters immediately adjacent to the urethral opening, and the accumulation of pleasurable sensation (Federation of Feminist Women's Health Centers, 1991; Sundahl, 2003; Wimpissinger et al., 2007; Winston, 2010; Zaviačič, Zaviačičová, Holomán, & Molčan, 1988a).

Sex educator Jaiya has reported that dry penetration, rough friction, or both can contribute to the formation of a thin layer of scar tissue that covers the upper vaginal surface (G-spot), which can penetrate into paraurethral tissues, prohibiting engorgement (Jaiya, 2011). The Wurns and their colleagues state that this sensitive tissue loses its pleasurable potential and requires sufficient locally applied manual therapy to regain its original plasticity and sensation (Sundahl, 2003; Wurn et al., 2009).

> [I]f you notice bumps, wiriness on the [vaginal vault] surface, something that feels like corduroy, a stocking, a hairnet, or on any surface but smooth tissue, then you are feeling tissues that may have been compromised by an adhesive process

> that is likely decreasing your sexual pleasure and function, or causing your pain, or both. We believe that adhesions can blanket this area, desensitizing it or pulling the tissue taut. When you lay a blanket over a sensitive structure, you cannot feel very well through it. We believe that it is this blanketing, tightening, or pulling sensation on and within the various areas of the vaginal wall that decreases desire, lubrication, arousal, and orgasms in women with decreased sexual function. (Wurn et al., 2009, p. 476)

The Wurns' description of a rough or tight texture at the G-spot area assumes that the palpation of this area is happening while the woman is not aroused. According to Sundahl, engorgement of this area due to arousal will create a ridged area that is stiffened, feeling like the ridges found behind the front teeth (Sundahl, 2003).

A richly descriptive world history of female ejaculation dates back to Aristotle in 400 BCE; Chinese Taoist sexual literature as early as the 4th century; and in Vatsyayana's Kama Sutra, dated between 400 BCE and 200 CE (Korda, Goldstein, & Sommer, 2010; Sundahl, 2003). There is little agreement about the structure, function and anatomical significance of the G-spot, also known as the female prostate (Korda et al., 2010; Meston et al., 2004; Puppo, 2011). Rigorous scientific investigation and explanations for the biological function of the G-spot and female ejaculation have been published, with over 250 articles mentioned in some literature reviews (Gravina et al., 2008; Jannini et al., 2012; Kilchevsky, Vardi, Lowenstein, & Gruenwald, 2012; Zaviačič & Ablin, 2000; Zaviačič et al., 2000; Zaviačič et al., 1988a). However, the existence and biological purpose of this controversial tissue is still questioned in some scientific publications (Meston et al., 2004; Puppo, 2011; Salama et al., 2015).

Researchers have identified the components of female ejaculate, which include neurotransmitters such as serotonin, as well as glucose, zinc, and prostate specific antigen (PSA) (Sundahl, 2003; Wimpissinger et al., 2007; Zaviačič & Ablin, 2000). Frohlich and Meston suggest that the presence of serotonin in the genital region may be acting in multiple places, including the endocrine, muscular, vascular, and peripheral nervous systems (Frohlich & Meston, 2000). They also postulate that serotonin modulates either vasodilation or vasoconstriction, depending on the receptor site that receives it (Frohlich & Meston, 2000). Thabet has suggested that chemical output of the gland could be curtailed from blockage in its tiny glandular ducts due to presence of scar tissue (Thabet, 2009).

Whipple, who was part of the team that identified the G-spot in the 1950s, "hypothesized that the adaptive significance of stimulation of the area of the G-spot would be to attenuate the pain of childbirth" (Jannini et al., 2012, p. 959). She and her group found that thresholds for pain tolerance in this area increased significantly when women reported orgasm and agree with Gaskin that orgasm occurs naturally during the progression of labor for some women (Jannini et al., 2012; Gaskin, 1990).

Scar tissue can interfere with G-spot sensitivity and function. Corton as well as Dietz and Wilson report that bladder descent is a common outcome of childbirth, affecting the tissues of the anterior vaginal wall, including the G-spot location (Corton, 2009; Dietz & Wilson, 2005; Hendrix et al., 2002). Hendrix et al. describe how there are two approaches to repairing a prolapsed bladder, either through the use of a mesh sling, or using endogenous tissue (Hendrix et al., 2002). The placement of mesh for cystocele (bladder prolapse) repair has been shown by Altman and his group to increase

postoperative complications in the vaginal vault, compared to the use of endogenous pelvic tissues (Altman, Väyrynen, Engh, Axelsen, & Falconer, 2011).

Sexual impairment is reported to be equally affected by mesh sling placement and traditional prolapse repair alike (Altman et al., 2011). The Wurns and others report that when surgical procedures to correct vaginal and bladder prolapse are undertaken, the G-spot becomes riddled with scars and adhesions (Thabet, 2009; Wurn et al., 2009). Thabet found that loss of pleasurable sensation was common once adhesions precluded engorgement of this tissue (Thabet, 2009). Sundahl states that the G-spot is also a place where women store "the emotional scars of sexual misuse or abuse . . . unwanted, but permitted entry into the vagina can also cause harm, because it requires 'lies to the self' and dissociation between the mind and the body" (2003, p. 156).

Late-Phase Excitation

During late-phase excitation, Levin and others describe how the anterior vaginal wall tents upward, making a pocket of space at its deep end (Graziottin & Giraldi, 2006; Komisaruk et al., 2006; Levin, 2002). Winston adds that the uterus is pulled superior and anterior (up and forward) of the bladder, lifting the cervix deeper into the vaginal canal (Winston, 2010). According to Winston and the FFWHC, this movement of the uterus lifts the cervix with it, deepening the vaginal space (Federation of Feminist Women's Health Centers, 1991; Winston, 2010).

The round ligaments of the uterus travel over the pubic bone to attach the uterus into the musculature and erectile tissues that surround the vaginal introitus (Chalker & Fish, 2002; Federation of Feminist Women's Health Centers, 1991; Winston, 2010). Both Winston and the FFWHC elaborate on how these ligaments are actually made of smooth

muscle, surrounded by a fibrous connective tissue sleeve, and as this smooth muscle contracts during later phases of excitement/arousal, the uterus changes position, by moving forward over the top of the bladder (Federation of Feminist Women's Health Centers, 1991; Winston, 2010). Researchers postulate that as the uterine position shifts forward, the cervix is pulled up and out of the way, making room for incoming penetration (Federation of Feminist Women's Health Centers, 1991; Levin, 2002; Winston, 2010).

Pain arises, according to many experts, when a low transverse incision, common to cesarean section, creates penetrating scar tissue. These scars adhere the round ligament of the uterus to the tissues immediately surrounding the surface of the pubic bone (Almeida et al., 2002; Wurn et al., 2009). When this happens, neither the uterus nor the cervix can accomplish the normal movement associated with high levels of arousal. The cervix is then vulnerable to painful buffeting contact from the penis, fingers, or other penetrating objects during intercourse or sexual play (Winston, 2010; Wurn et al., 2009).

Orgasm

During female orgasm, the muscles surrounding the vaginal opening are reported to rhythmically and involuntarily contract (Meston et al., 2004; Winston, 2010). Researchers also describe how along with the contractions of these striated skeletal muscles come rhythmic contractions of smooth muscle structures, including the vagina, uterus, cervix, and internal anal sphincter (Meston et al., 2004; Winston, 2010). Levin suggests that it is likely that smooth muscle components of the connective tissues in the pelvic floor contract as well, adding to the pumping mechanics that return blood sequestered during engorgement back to regular circulation (Levin, 2002).

Graziottin, Giraldi and Winston submit that during arousal, engorgement and movement, the bulbospongiosus muscle compresses veins that enable and maintain the erection of the glans of the clitoris. The ischiocavernosis muscle similarly compresses the vasculature of the clitoral legs, maintaining their engorgement (Graziottin & Giraldi, 2006; Winston, 2010). In addition to these muscles, which surround the vaginal introitus, research has found that other muscles of the pelvic floor are vulnerable to injuries from childbirth and its interventions as well (Corton, 2009; Graziottin & Giraldi, 2006; Dietz & Lanzarone, 2005).

> Lesion [tearing] of the medial fiber of the pubococcygeus [PC muscle] at delivery may cause an impairment of vaginal sensitivity during thrusting [of intercourse], and contribute to postpartum orgasmic difficulties, besides concurring to stress incontinence. Defects of the hiatus are responsible for many pathologic entities such as cystocele, rectocele, uterine prolapse which may all cause sexual problems for the woman. (Graziottin & Giraldi, 2006, p. 14)

Levin and others have stated that vaginal tenting and uterine movement are at their most extreme immediately before a woman's orgasm (Boston University School of Sexual Medicine, 2002; Levin, 2002). It is postulated that vaginal tenting provides a pool for semen accumulation, and may also attenuate friction on the penis, postponing the immediacy of male ejaculation (Boston University School of Sexual Medicine, 2002; Levin, 2002; Meston et al., 2004). During female orgasm, the uterus is reported to pulse deeply, providing women with intensely pleasurable sensations (Meston et al., 2004; Puts & Dawood, 2006; Winston, 2010).

There is some evidence that each individual's subjective experience of orgasm may differ, depending on the point of stimulation that initiates this particular orgasmic response (Meston et al., 2004). Orgasms driven by stimulation of the G-spot along the anterior vaginal wall or vaginal vault are postulated to affect smooth muscle structures differently than orgasmic responses from clitoral stimulation. Winston and Sundahl suggest that the throbbing of uterine contractions may be more strongly felt in orgasmic responses driven by G-spot stimulation, due to innervation differences between the clitoris and G-spot (Sundahl, 2003; Winston, 2010).

Several researchers have reported that women with Pfannenstiel incisions complain of ongoing abdominal or back pain, and from consistent cramping during intercourse due to cervical battering and fixation, common after C-section (Batioglu & Zeyneloglu, 2000; Nikolajsen, Sørensen, Jensen, & Kehlet, 2004; Wurn et al., 2009). Nezhat has written that scars and adhesions from endometriosis can fixate the uterus, bladder, and ovaries to each other and onto the peritoneum, creating "frozen pelvis syndrome" (Nezhat, 2012, para 7). Others agree that when uterine mobility and motility are restricted, the uterine response to sexual cues will be disabled (Barral, 1993; Winston, 2010; Wurn et al., 2011).

Resolution

During the resolution phase of Masters and Johnson's sexual response cycle, the body returns to homeostasis (1966). The complex physiologic changes described above return to their pre-arousal states, vagina and vulva lubrication is reabsorbed, and blood is returned from its sequestration during engorgement back to systemic circulation. Blood pressure, heart rate, and breathing return to normal (Ohl, 2007).

Puppo, Puppo, and Winston maintain that the muscles surrounding the vaginal introitus play a key role in returning blood sequestered during engorgement back to systemic circulation (Puppo & Puppo, 2015; Winston, 2010). But, according to Graziottin and Giraldi, muscular damage caused by injuries and adhesions in the connective tissue surrounding these muscles may inhibit this process (Graziottin & Giraldi, 2006). The Wurns and their colleagues agree that damaged muscles, as well as impingement to the nerves that stimulate these muscles, will affect the return to a pre-arousal state (Wurn et al., 2009; Wurn et al., 2004).

Additionally, Carter, Howard and Basson postulate that if lymphatic drainage is restricted due to blockage by scar tissue, painful pelvic congestion can result (Basson, 2005; Howard, 2000). Gunter and Howard linked pelvic congestion syndrome with chronic pelvic pain (Gunter, 2003; Howard, 2003), while Kettle and her group linked pelvic congestion to deep dyspareunia following childbirth (Kettle et al., 2005). This overview of the stages of sexual arousal and how it is affected by scar tissue indicates the importance of understanding the physiology of female sexual response and of remediating scar tissue problems.

Scar Tissue Remediation: Manual Therapies

This review of literature has found a plethora of evidence suggesting that scars have biomechanical, biochemical, surgical, and emotional origins, and seem to be an inevitable outcome of life lived in the body. Women often acquire scars as part of their childbirth experience. These scars can cause pain during sexual encounters and may interfere with the relational aspirations of the women whom they affect. This section of

the review of literature is an overview of popular manual treatments currently used to treat scar tissue, including scars in the pelvic floor.

Osteopathic Manipulation Techniques (OMT)

Andrew Taylor Still was the founder of osteopathy, and biographers note that he opened the American College of Osteopathy in Kirksville, MO, in 1892 (Lewis, 2012; Paulus, 2009; Trowbridge, 1991). Still is reported to have had a prescient respect and understanding of the role of fascia as a mediator of health (Findley & Shalwala, 2013a). This dissertation will focus on Still's understanding of the influence that scars and adhesions have on pain and the etiology of disease. According to Thomas Findley, a founder of the International Fascial Research Society, findings of many researchers who presented at the International Fascial Congresses from 2007 to 2012 map elegantly onto Still's understanding of fascia. Here Findley quotes Still's description of fluid dynamics and health, and the obstructive potential of scars and adhesions (Still, 1899, pp. 164–165):

> Fascia functions by "secreting and excreting fluid vital and destructive. By its action we live, and by its failure we shrink, swell, and die . . . This connecting substance must be free at all parts to receive and discharge all fluids, if healthy to appropriate and use in sustaining animal life, and eject all impurities that health may not be impaired by the dead and poisoning fluids. (as cited in Findley & Shalwala, 2013a, p. 360)

Here, Still is saying that if scars and adhesions are blocking the free movement of fluids, swelling will occur, and poisons, which would otherwise normally be drained, are not able to leave the tissue. When poisons accumulate, this degrades the health of the

individual. The writings of Pischinger describe a strikingly similar point of view in *The Extracellular Matrix and Ground Regulation*, first published in English over 100 years later (Pischinger, 2007).

Much as in Still's description above, many of today's osteopaths understand scars as systemic problems with broad implications for body dysfunction (Belden, Lloyd, & Rowane, 2003). On their website, the American Osteopathic Association reports that the first tenet of osteopathic medicine is, "The body is a unit; the person is a unit of body, mind, and spirit" (p. 11). Belden and his group used this quotation in their article on scar tissue, which stated: *"*This osteopathic principle represents how a scar can affect a person's entire wellbeing" (p. 11). Belden and his group, and Dennenmoser, Schleip, and Lingler, each describe how osteopathic scar treatment seeks to improve elasticity, circulation, and immune response in affected connective tissue, organs, bones, or muscles. They state that scars are assessed by palpation and the use of ultrasound to determine the tension of the tissue and density of local fascial structures (Belden et al., 2003; Dennenmoser, Schleip, & Klingler, 2016).

It is notable that Belden and his group suggest, "the first step in scar management is to consider the whole patient. The stressors and history behind the scar are important to address prior to subsequent treatment," encouraging a holistic approach to the treatment of scars and their aftermath (Belden et al., 2003, p. 11). Belden describes how osteopathic scar treatments include the use of barrier-release, skin rolling, effleurage (a gentle massage technique), and manual stretching. Italian osteopaths Zanier and Bordoni note, in their narrative review of complementary therapies, that diaphragmatic breathing is used to increase lymphatic exchange and oxygenation of scar tissue and is part of their

osteopathic approach to scar remediation (Zanier & Bordoni, 2015). Tozzi and Minasny have written that fascial unwinding is another technique used to treat adhesions and scar tissue and is applied to the entire area surrounding a scar, not only to the scar itself (Minasny, 2009; Tozzi, 2012).

In his instructional manual for craniosacral therapy, Scottish osteopath Hugh Milne writes that fascial unwinding is an indirect approach to treating scar tissue that is accomplished by holding the joint, bone, or muscle affected by the scar and listening to the tissue, waiting for any intrinsic natural movement to express itself (Milne, 1995a). In his books and classes, he instructs practitioners to follow the motion of the tissue, providing manual support for the body's movement. Both Milne and Tozzi suggest that unwinding is based on the osteopathic belief that the body intrinsically knows what it needs to heal, and that by providing a skilled and listening hand, tissues will express this intrinsic intelligence (Milne, 1995a; Tozzi, 2012). Milne further suggests that feelings that could not be experienced at the time of the injury, surgery, or other cause(s) of any particular scar, are encouraged to come into the patient's awareness for integration as tissue and scar unwinding progresses (Milne, 1995a). Davis and her group used unwinding as one of many cranial osteopathic techniques, reported to reduce PTSD symptoms in soldiers returning from Afghanistan in a paper published in 2015 (Davis, Hanson, & Gilliam, 2016).

Physical Therapy (PT)

In a textbook chapter about the evolution of physical therapy, Nicholson describes how the profession of physical therapy first developed in the US between 1914 and 1920 in response to WWI and the polio epidemic. The first physical therapists were women

called reconstruction aides. They were employed in military hospitals to tend wounded soldiers returning from European battlefields (Nicholson, 2008). Moffat recounts that there was no shortage of injury and scar tissue to be treated, and the primary modes of treatment during the formative years of physical therapy were "isolation, immobilization, splinting, bed rest, and later surgery" (Moffat, 2003, para 2).

The difference between osteopathic treatments, which utilized manipulation and mobilization techniques to treat scars and adhesions, versus the immobilization recommended as treatment by reconstruction aides during the 1930s and 1940s is noteworthy. Osteopath Eyal Lederman states that the benefits of tissue mobilization outweigh immobilization by "1. Improving the quality of repair. 2. Improving the rate of repair. 3. Improving drainage of oedema following tissue damage. 4. Reducing overall pain" (Lederman, 2003, p. 2). In her book about polio and the battle to change protocols for its treatment, Naomi Rogers notes the resistance to change from the immobilization model to one of gentle tissue mobilization. To treat polio from the 1930s onward, Rogers describes the work of Sister Elizabeth Kenny, whose methods became standardized as part of physical therapy (Rogers, 2014).

A second physical therapy textbook recounts that physical therapy was incorporated into the allopathic military hospital model and rapidly developed new therapies for injured soldiers returning from WWII (Dreeben-Irimia, 2010). Moffat mentions that teaching the injured how to use new prosthetic devices, rehabilitation of injuries through muscular training exercises, and the use of various electrical stimulation devices became part of the scope of physical therapy (Moffat, 2003). Dreeben-Irimia describes how from the 1950s through the 1970s the profession grew rapidly, spreading

widely into generalized allopathic medicine. The scope of the profession has continued to grow, adapting to the needs of hospitals to treat a wide variety of injuries, and to provide surgical rehabilitation, including scar tissue remediation (Dreeben-Irimia, 2010).

The American Physical Therapists Association's website describes how today's physical therapists treat and manage physical disabilities, malfunctions, and pain using exercises, massage, hydrotherapy, electrical stimulation, and biofeedback without the use of medicines, surgery, or radiation (American Physical Therapy Association, 2015). Israeli physical therapist Talli Rosenbaum emphasizes that physical therapists treat pelvic pain, and have scope of practice to touch the pelvic floor, and are pivotal for many women in treating sexual pain resulting from childbirth or other pelvic floor trauma, addressing:

> Specific conditions such as sexual dysfunction related to urogenital disorders or surgical complications, vaginismus, generalized and localized vulvodynia, pudendal neuropathy, and persistent genital arousal disorder. The common denominator in these conditions is pelvic floor pathology, an area of specialization within physical therapy. (Rosenbaum, 2008, p. 97)

A number of physical therapists have opened specialized physical therapy clinics to address painful conditions in the pelvic floor, including scar tissue (Herrera et al., 2011; Prendergast & Rummer, 2007; Wurn et al., 2011). According to publications written by physical therapists who work in these clinics, they offer manual treatment for pain and infertility resulting from accumulation of adhesions in women's reproductive organs, as well as abdominal adhesions from gynecological and abdominal surgeries (Fontaine, 2012; Prendergast & Rummer, 2007; Wurn et al., 2004). According to their

publications, physical therapists assess pelvic floor pain via palpation, and may include electrical tissue stimulation (e-stim), biofeedback, massage, and exercises to stretch and strengthen pelvic floor muscles as part of treatment (FitzGerald & Kotarinos, 2003b; Rosenbaum, 2005; Wasserman, Steele, Halkiotis, Yuen, & Riggins, 2016).

According to Goldfinger and his group, physical therapists are often part of a larger team working with women who experience painful sex due to scar tissue. This team may include psychotherapists, MDs, psychiatrists, or other medical professionals (Goldfinger, Pukall, Gentilcore-Saulnier, McLean, & Chamberlain, 2009). The Wurns and their colleagues estimate that the number of physical therapists who specialize in the treatment of scars that cause painful sex is miniscule compared to the number of women who have need of their services (Wurn et al., 2009).

Thiele Massage

Osteopath and fascia specialist Leon Chaitow describes how George Thiele developed internal vaginal and anal massage techniques during the 1930s as a way to treat coccygodynia, which is pain in the tailbone region (Chaitow, 2007b). Dr. George Thiele published his influential paper about the efficacy of this technique in 1937, in which he described the use of intra-anal massage as a way to gain access to muscle origins on the anterior face of the sacrum, and relieve pain not otherwise successfully treated (Chaitow, 2012b; Thiele, 1937). Thiele and others have described the massage as consisting of 5-minute periods of massage along the length of pelvic floor muscles, from origin to insertion, from either an intra-anal or intravaginal approach (Chaitow, 2007b; Thiele, 1937). Chaitow reports that periodic holding of tender (trigger) points for 10–15

seconds is performed when contact with these tender points reproduces familiar symptoms such as burning, referred, or radiating pain (Chaitow, 2012b).

Intra-anal work is a novel approach to pain relief and has been documented to be in use by doctors, chiropractors, physical therapists, osteopaths, Sexological Bodyworkers, and others who have scope of practice to touch pelvic floor structures (Chaitow, 2012b; Lukban & Whitmore, 2002; Medici, 2011a; Oyama et al., 2004). Thiele stated that the massage is begun lightly, and pressure is deepened as the patient can tolerate increased sensation (Thiele, 1937). In addition to the treatment of muscles attached or adjacent to the coccyx, Thiele massage has been reportedly used as a treatment for the conditions of dyspareunia, shortened pelvic floor muscles, overactive bladder, painful bladder syndrome, and chronic pelvic pain (De Souza Montenegro et al., 2010; Lukban & Whitmore, 2002; Oyama et al., 2004; Pastore & Katzman, 2012).

Chaitow, physical therapists, and medical doctors have written that Thiele massage is used to access trigger points found in deep pelvic muscles from inside the vaginal or anal canals (Chaitow, 2007b; De Souza Montenegro et al., 2010; Whelan, 2014). A trigger point is often defined as a taut band of painful muscle and can often be traced back to the same injuries that perpetuate active scars (FitzGerald et al., 2012; Kobesova et al., 2007). It is suggested that injuries to the deep muscles of the pelvic floor create trigger points that refer pain into the vagina, rectum, and perineum (Pastore & Katzman, 2012). Many practitioners report that direct massage onto the muscular walls of these cavities can relieve trigger points and provide significant pain relief to distal points of referred pain (Chaitow, 2012b; Lukban & Whitmore, 2002; Thiele, 1937).

Trigger Point Therapy (TrP)

According to McPartland, internist Janet Travell developed trigger point therapy between 1940 and the 1950s (McPartland, 2004). Travell developed her work with trigger points as an outgrowth of working first with arm and shoulder pain, and later with spinal manipulation. She was reported to have successfully treated Senator John F. Kennedy for back pain after two failed back surgeries and was later appointed White House physician during the Kennedy administration (McPartland, 2004). Both Wilson and McPartland agree that her visibility as White House physician, along with the publication of her seminal two-volume book, *Myofascial Pain and Dysfunction: The Trigger Point Manual* with co-author David Simons, brought her work to the public with significant impact (McPartland, 2004; Wilson, 2003).

Trigger points are described as exquisitely sensitive spots in muscles, which also refer pain to areas distal to the palpable point of sensitivity (McPartland, 2004). Travell described a trigger point as "a hyperirritable spot in skeletal muscle that is associated with a hypersensitive palpable nodule in a taut band. The spot is tender when pressed and can give rise to characteristic referred pain, motor dysfunction, and autonomic phenomena" (McPartland, 2004, quoting Travell & Simons, 1999, p. 5). Travell's daughter relays that in the early days of trigger point therapy, these tender points were treated by injection with lidocaine (Wilson, 2003).

In his book on chronic pelvic pain, Chaitow suggests that trigger points are often found in pelvic pain presentations and appear to be morphologically distinct from scar tissue (Chaitow & Jones, 2012). In a separate paper, Chaitow elaborates that trigger points occur in muscles, while active scars perpetuate through the fascia (Chaitow,

2007b). However, both Pischinger and Tozzi point out that a coating of fascia surrounds every individual muscle cell, and the nerve supply to muscle cells is mediated through this fascial layer (Pischinger, 2007; Tozzi, 2015a). The work of many researchers suggests that myofascial trigger points create biochemical changes in muscle tissue that also change the chemical composition, pH, and inflammatory product output in the local myofascial milieu, including the fascia and ECM (Chaitow, 2007b; McPartland, 2004; Shah & Gilliams, 2008; Tozzi, 2015a; Weiss, 2001).

The work of Jarrell and Magali has suggested that trigger points, like scar tissue can be classified as "latent," or "active," meaning the patient can point out an active or painful spot readily (Jarrell & Magali, 2003; Jarrell & Robert, 2003). Weiss and others add that trigger points may create the conditions for active scar tissue by changing the biochemical conditions in the fascia surrounding each muscle fiber, and therefore contribute to ongoing pain (Jarrell & Robert, 2003; McPartland, 2004; Weiss, 2001). The work of Stecco's group, as well as that of Tozzi, has described fascia as an organ of perception, which like active trigger points, contributes to the perception of pain (Jarrell & Robert, 2003; Stecco et al., 2010; Tozzi, 2012). Several research groups have linked trigger points in the pelvic floor to chronic back pain and emotional stress (Anderson, 2002; Chaitow, 2007b).

> Predisposing factors for the formation of myofascial trigger points [in this region] include mechanical abnormalities in the hip and lower extremities; chronic holding patterns, such as those that occur in toilet training; sexual abuse; repetitive minor trauma in constipation; sports that create chronic pelvic stimulation; trauma; unusual sexual activity; recurrent infections; and surgery.

> Pelvic floor muscles are commonly tightened out of instinct under stress. Initiating factors that incite trigger points are often forgotten; they may not arise from a single event but are rather additive in nature. There seems to be a general association with the process of somatization. (Chaitow, 2007b, quoting Anderson, 2002, p. 331)

In the quote above, Anderson suggests an intrinsic connection between emotional triggers, biomechanical triggers, and biochemical triggers for pelvic pain. Due to the broad variety of causes listed, a number of practitioners have suggested that an equally broad number of holistic therapies may work to treat such variable causes of pain. Practitioners across several disciplines suggest that both trigger points and scar tissue are successfully treated by the use of manual modalities, including Thiele massage, other massage techniques, and Sexological Bodywork (Medici, 2011a; Prendergast & Rummer, 2007; Weiss, 2003; Weiss & Prendergast, 2006). Lewit and others have suggested the use of acupuncture, other dry-needling techniques, and injections with local anesthetics such as lidocaine (Jarrell & Robert, 2003; Kobesova et al., 2007; Langevin et al., 2001; Lewit, 1979; Lewit & Olsanska, 2004).

Structural Integration (SI)

Ida Rolf is reported to have been doing bodywork as early as the 1940s, and she developed her own bodywork method over the following 20 years (Jacobson, 2011). Both Jacobsen and Myers cite that influences on her work were wide ranging, and included osteopathy, yoga, the work of Wilhelm Reich, Buckminster Fuller, and Alfred Korzybski's theory of General Semantics (Jacobson, 2011; Myers, 2004b). According to Jacobsen, Rolf codified her approach during the 1950s, eventually creating the Rolf

Institute of Structural Integration in 1971 (Jacobson, 2011). Many manual training organizations have developed some form of Structural Integration (SI) into the present day. Jacobson estimates that as of 2004, 3,000–4,000 practitioners were practicing Structural Integration, casually called Rolfing, worldwide (Jacobson, 2011). Myers succinctly describes how Structural Integration seeks to "organize the body closely around the vertical line of gravity and lengthen it along that line" (Myers, 2004a, p. 133).

Rolf described the body as being molded in part by the earth's gravitational field, in addition to being molded by the psyche (Rolf, 1977). Rolf's students report that she sought to optimize grace and ease of movement by direct manipulation of the fascia (Myers, 2004a; Novey, 2000; Walker, 2014). Structural integrator Thomas Walker says, "[o]ur knowledge of anatomy and biomechanics directs our intentions. We want the fascial interfaces to become more slippery. We want the dried-out scar tissue to become more pliable and soft. We want dense places to soften and release" (Walker, 2014, p. 72). This is reported to be accomplished over a series of 10 sessions, according to a *recipe* of specifically sequenced manual work seeking to re-organize posture in relation to gravity (Myers, 2004a, 2004b). Rolf emphasized the connection between the order of one's psyche and the organization of posture: "By structural organization of the body, specifically of its fasciae, we can lessen disorder at the unconscious level" (Rolf, 1977, p. 37).

Understanding the implications of scar tissue and adhesions is considered foundational to the work of Structural Integration. Referred to as *gluing*, they are recognized to occur in "practically all bodies" (Rolf, 1989, p. 129). Fascial adhesions between muscles are characterized as "small lumps, or thickened, nonresilient bands

[that] can be felt deep in the tissue. The lumps may be as small as peas or as large as walnuts" (p. 129). Palpable tissue changes are sought, and the work is not considered to be complete unless these tactile goals are met (Walker, 2014).

The tone of both muscles and fascia, especially in the pelvis, was seen to reflect biochemical balance in the body: "Tone is the name given to outward manifestations of homeostatic chemical balance of the individual as a whole as well as to the chemical well-being of particular areas or organs" (Rolf, 1977, p. 138). This chemical balance has been consequently validated by current research (Tozzi, 2015a). The reaction of fascia to the influence of inflammatory cascades of cytokines, neuropeptides, nociceptive chemicals, hormones, and growth factors has been well documented, and continues to be investigated in minute detail (Diegelmann & Evans, 2004; Findley & Shalwala, 2013a; Kjaer, 2004; Langevin et al., 2011; Mammoto & Ingber, 2010; Tozzi, 2015a, 2015b).

Connective Tissue Manipulation

Orthopedic massage has been reported by Lowe, as well as by Brown, as a specific massage technique used since the 1980s as a way to treat pain, injuries, and scar tissue (Brown, 2013; Lowe, 2014). According to Benjamin, orthopedic massage was deeply influenced by the assessment methods of English and orthopedic specialist James Cyriax MD between 1940 and 1980 (Benjamen, 2006). Benjamin and others relate that Cyriax was one of the first physicians to emphasize the importance of precise evaluation and treatment for soft tissue injuries in the context of orthopedic medicine; he developed an elaborate series of physical tests to determine the precise etiology of individual injuries, differentiating the source of pain from neural, muscular, connective tissue, or bony origins (Benjamen, 2006; Cyriax, 1955; Pellecchia, Paolino, & Connell, 1996).

Cyriax described his method of deep cross-fiber friction to treat injured tissues and scars in a number of lengthy textbooks and manuals (Cyriax, 1982; Cyriax & Cyriax, 1985; Cyriax, 1985). Many practitioners refer to the use of cross-fiber technique, and how it is applied directly to adhesive scar tissue. This tissue, through accurate assessment, has been demonstrated to be less mobile than neighboring tissues (Benjamen, 2006; Brown, 2013; Chamberlain, 1982; Zanier & Bordoni, 2015). Others state that Cyriax's theory was that, by increasing circulation and mobilizing the injured and adherent tissues, beneficial realignment would occur in the random organization of scarred collagen fibers (Chamberlain, 1982; Loghmani, 2010). Cyriax describes his primary technique for scar tissue: "[A]dhesions also require manipulative rupture, not by stretching, which merely approximates the muscle fibres, but by teasing them apart with deep transverse massage; for it is not possible to broaden out muscles artificially in any other way" (Cyriax, 1982, p. 17).

Recent research into methods that utilize deep cross-fiber and friction massage theorize that heat generated from cross-fiber friction restores glide in adhesive tissue, and reduces impedance of the free movement of collagen and elastic fibers (Alter, 1996; Ercole, Antonio, Ann, & Stecco, 2010). Many clinicians have reported noticing palpable release after the application of deep friction and cross-fiber techniques to stiff and fibrotic tissue (Ercole et al., 2010; Fernández-de-las-Peñas, Alonso-Blanco, Fernández-Carnero, & Miangolarra-Page, 2006; Loghmani, 2010; Medici, 2013d). However, it has been noted, "no definitive explanation for the biomechanical bases of these transformations exists" (Ercole et al., 2010, p. 319).

Myofascial Release (MFR) is a generic term that is described as a renaming of osteopathic techniques developed by A. T. Still in the late 19th century (Coughlin, 2002). The term is attributed to osteopath Robert Ward, who developed a course in these manual methods in the 1960s (Stillerman, 2008). According to Jones, physical therapist John Barnes popularized the term *myofascial release* by creating training programs for physical therapists and massage therapists in the 1980s (Coughlin, 2002). Several practitioners describe how myofascial release includes a wide variety of techniques that are applied to muscular and fascial structures, including gentle barrier release methods to address scars and adhesions (Barnes, 2008; Barnes, 1997; Coughlin, 2002; Stillerman, 2008). According to Lewit and his colleagues, a barrier release is accomplished by pushing tissues up to a point where the practitioner can feel the restriction of movement, and then continuing to apply constant pressure until a release of the restriction is obtained (Kobesova et al., 2007).

Myofascial release addresses pelvic scar tissue in particular, according to Barnes, who recognizes that "[s]cars from abdominal or pelvic surgery, trauma or episiotomy scars can also create havoc in the pelvic area, causing menstrual dysfunction, pelvic pain, painful intercourse, constipation, diarrhea or hemorrhoids" (Barnes, 2008, p. 70). Barnes states that the technique seeks to address fascial adhesions throughout the pelvis, in both superficial and deep layers of tissue (Barnes, 1997). Barnes also suggests that scar tissue is central to the presentation of symptoms of cystitis, sacrococcygeal lesions, pelvic torsion, headaches, and back pain (Barnes, 2008).

Bodywork trainer John Barnes states that, depending on the practitioner and the style of myofascial release used, MFR sessions may or may not invite emotional release

as part of the process (Barnes, 2008). Barnes suggests that his hands-on methods “relieve the emotional pain associated with past unpleasant events or traumas. The painful memories or emotions from beatings, rapes, molestation or miscarriages seem to be stored in the body’s memory” (p. 71). He further submits that while painful memories may have been dealt with cognitively, that vestiges of the painful event will continue to be stored in fascial tissues.

Connective Tissue Massage (CTM) was reportedly developed in Germany under the name "Bindegewebmassage" by physiotherapist Elizabeth Dicke in the late 1920s (Goats & Keir, 1991). According to Goats and Keir, she developed her technique by working on her own back to relieve lumbosacral pain. They submit that she noticed that relief from a chronic case of inflammation in the arteries in her legs (endarteritis obliterans) was an unexpected outcome of self-treatment, successfully avoiding a nearly certain case of gangrene due to her circulatory condition (Goats & Keir, 1991).

Dicke reportedly worked with several researchers to develop her work, and eventually incorporated the findings of Head and MacKenzie, British doctors who published papers on patterns of pain referral related to autonomic and visceral dysfunction in the late 19th and early 20th centuries (Beissner, Henke, & Unschuld, 2010; Mackenzie, 1906; Utting, 2013). Goats and Keir note that the technique of CTM involves deep touch along the areas adjacent and parallel to the spine, and deep penetration and manipulation of the thoracolumbar fascia (Goats & Keir, 1991). In a review article, Holey and Dixon report that it is central to CTM treatment to differentiate the skin layer from the fascial layers beneath (Holey & Dixon, 2014). In her book about

this technique, Ebner mentions that treatments may last from 45 to 50 minutes, and no lubrication is used (Ebner, 1962).

In a paper for the *Journal of the American Physical Therapy Association*, Reed and Held state that the theory of CTM suggests that autonomic and cutaneous reflexes are activated by the combination of deep touch, differentiation of tissue layers, and friction. Increased blood circulation is noted in addition to significant reduction in pain, even at points distal to where pressure has been applied (Reed & Held, 1988). Research into the efficacy of CTM continues, and current research has shown improvements in diabetic patients with peripheral neuropathy, temporary pain relief and better lymphatic drainage in patients with fibromyalgia, and reduction of symptoms of anxiety states (Ekici, Bakar, Akbayrak, & Yuksel, 2009; Holey & Dixon, 2014; McKechnie, Wilson, Watson, & Scott, 1983; Reed & Held, 1988).

Visceral and Urogenital Manipulation (VM and UM)

Urogenital manipulation (UM)is a subset of visceral manipulation (VM), developed by French osteopath Jean Pierre Barral, who published a series of books about VM and UM techniques in the late 1980s. Barral describes osteopathic techniques that employ subtle hands-on manipulation and manual *listening* skills to affect the mobility and motility of internal organs (Barral, 1993). In addition to teaching visceral and urogenital manipulation in France, Barral sits on the faculty of two French universities and a hospital in Paris. The Barral Institute is his teaching organization for VM in the US.

Barral states that urogenital manipulation was developed in response to the many patients in his clinical practice in need of solutions to urogenital pain (Barral, 1993). Physical therapist Talli Rosenbaum lists UM as a technique to aid in scar tissue release,

and reports that UM includes intravaginal and intra-anal work (Rosenbaum, 2005). Visceral Manipulation practitioner Harvey Ruderian relates that this work is used to affect the motility and mobility of pelvic glands and bones, genitals, reproductive organs, and organs of elimination (H. Ruderian, personal communication, December 19, 2015).

Current statistics suggest that there are approximately 14,000 practitioners who have completed basic VM training between Europe and the US (Panagopoulos, Hancock, & Ferreira, 2013). This student body is reportedly comprised of osteopaths, physiotherapists, nurses, and massage and craniosacral therapists. According to VM practitioner and Rolfer Harvey Ruderian, the number of practitioners for UM is much smaller, due to limitations in the number of individuals who have scope of practice to touch the pelvic floor (H. Ruderian, personal communication, December 19, 2015).

In his books, Barral states that in the theory of both VM and UM, the health of every internal organ is expressed as movement, both intrinsic and extrinsic (Barral & Croibier, 1999; Barral, 1993). Organ mobility describes the free movement of an organ within its space in the body; it is "the visible extrinsic movement of a structure in response to its environment" (Barral, 1993, p. 8). Smythe et al. and others describe how motility is the rotational ability of the organ relative to its physiologic axis and is expressed on a rhythmic and cyclical basis (Barral, 1993; Russell, 2008; Smythe et al., 1999). Russell reports that both VM and UM are used to facilitate the optimal intrinsic and extrinsic movements of structures targeted for therapy. The assumption is that this subtle rhythm of health can be palpated (Barral, 1993; Russell, 2008).

Russell states that both VM and UM treat scars and adhesions (Russell, 2008). Research has shown that VM techniques can lyse adhesions in rat models (Bove &

Chapelle, 2012). Kramp tells that VM was among several techniques used in a study to improve fertility in women who had been unable to conceive after a year of having unprotected sex. She found that 6 of the 10 women in the study conceived after treatments that included VM and lymphatic drainage (Kramp, 2012).

Indications for the use of Barral's methods include low back pain, adhesions, dyspareunia and anorgasmia, infertility, dysmenorrhea, and pelvic pain. Barral also suggests that UM is beneficial for the prevention of obstetrical problems (Barral, 1993). To date, there are few studies of the efficacy of UM to relieve painful intercourse due to adhesions and scar tissue, although anecdotal reports support the use of UM for painful intercourse:

> Scar tissue from pregnancy and childbirth (no matter how long ago) is not confined to the area of trauma, i.e. an episiotomy. It worms its way through the body, tightening and pulling you out of alignment. Your body compensates around the injury over time, only compounding the problem. The treatment that yielded the most results for women was visceral manipulation. The best way to describe it was "a melting sensation", as if the scar tissue was melting away and my body was correcting itself at last. It turns out I had some scar tissue around my duodenum and kidneys, which again provided an amazing melting sensation when manipulated under gentle fingertip pressure. (Stedmon, 2016, para 7)

Vaginal Acupressure (VA)/Hippocratic Pelvic Massage

Vaginal Acupressure (VA) and/or Hippocratic Pelvic Massage is a modality developed in contemporary Denmark by medical researcher Soren Ventegodt (Ventegodt, Morad, Hyam, & Merrick, 2004). According to Ventegodt, vaginal acupressure includes

intravaginal massage, and static holding of intravaginal acupoints. This modality is described as used in combination with "acceptance through touch," a mind/body modality that uses palpation, along with questioning by the practitioner, about the emotional quality of what may be held in the body's tissues (Ventegodt, Clausen, & Merrick, 2006).

Ventegodt describes his methods as being based in ancient techniques used by Hippocrates and calls this method of vaginal massage Hippocratic Pelvic Massage (Ventegodt, Clausen, & Merrick, 2006). He states that the highest ethical standards must be upheld in order to practice his methods, and his holistic sexological procedures derive from "reparenting, massage and bodywork, conversational therapy, philosophical training, healing of existence during spontaneous regression to painful life events (gestalts), and close intimacy without any sexual involvement" (p. 2109).

Ventegodt states that the three principles that best describe the goals of this therapeutic approach are "feel, understand, and let go" (Ventegodt, Clausen, Omar, & Merrick, 2006, p. 2069). Many publications by Ventegodt and his colleagues report that first the patients' feelings need to be re-experienced, then the patients must verbalize their perceptions of the connection between their feelings and where the feelings are stored in their bodies. The last step of the process is to let go of negative attitudes and beliefs that are associated with both the physical pain and the patients' emotional state.

Ventegodt submits the theory of VA is that unresolved problems related to negative beliefs and repressed emotions lead to pain and other dysfunction in the pelvis (Ventegodt, Clausen, Omar, & Merrick, 2006). Conditions he claims are improved by vaginal acupressure include "urine incontinence, bleeding, and hormonal disturbances; unwanted childlessness; sexual problems like pain during intercourse; primary

vulvodynia; or low ability to feel lust, pleasure, sexual excitement, and/or to reach sexual climax; to non-inflammatory perineal and anal pains (p. 2069).

Treatment is titrated using the model of a therapeutic staircase, which Ventegodt and his group suggest includes this sequence of steps: "(1) Love, (2) trust, (3) holding, (4) healing, (5) group therapy, (6) life purpose-character-coherence, (7) 'energy' work, (8) cathartic work, (9) mind-expanding/ego-transformative techniques, (10) extreme (often traumatizing) techniques" (Ventegodt, Clausen, Nielsen, & Merrick, 2006, p. 2051). His idea is that treatment must be applied carefully, and less invasive methods for treatment that are lower in the sequence of the staircase model must be tried before moving on to a more invasive next step (Ventegodt, Clausen, Nielsen, & Merrick, 2006). Advanced treatments are reported to include internal vaginal massage and holding of vaginal acupressure points in order to treat scar tissue, both emotional and physical (Ventegodt, Clausen, & Merrick, 2006; Ventegodt, Clausen, Nielsen, & Merrick, 2006).

Scar Tissue Remediation: Non-manual Therapies

There are many non-manual techniques to treat scar tissue used by physical therapists, orthopedists, gynecologists, urologists, and other practitioners. This dissertation is primarily focused on the use of manual techniques to treat scars. A cursory coverage of non-manual methods will be included here.

Rosenbaum recounts that the use of contraction exercises to strengthen muscles of the pelvic floor was first developed in the early 1950s by Dr. Kegel (Rosenbaum, 2008; Rosenbaum & Owens, 2008). Bo and her group, and others have stated that Kegel exercises have been used to treat sexual dysfunction, urinary incontinence, and prolapse (Bo, Talseth, & Vinsnes, 2000). In their study of the efficacy of pelvic floor training,

Beji, Yalcin, & Erkan documented that "an improvement in sexual desire, performance during coitus and achievement of orgasm were observed in women who received pelvic floor muscle rehabilitation" (Beji, Yalcin, & Erkan, 2003, abstract).

There is some controversy about whether Kegel exercises are universally beneficial for pelvic dysfunction. For example, FitzGerald and Kotarinos, as well as others, argue that an already shortened pelvic floor will become further shortened through overuse, due to too many Kegel contractions (FitzGerald & Kotarinos, 2003a, 2003b; Rosenbaum & Owens, 2008). A brief review of online pelvic floor articles and advice blogs conveys a variety of opinions regarding the use of Kegel exercises; many articles claim that most women lack an understanding of how to do them properly (Ausnit & Miller, 2008; Thom, 2010). Physical therapist Janet Hulme designed a home-study course called *Beyond Kegels*, illustrating her opinion that the use of Kegel exercises alone is an incomplete approach to pelvic floor remediation in the postpartum period (Hulme, 2003).

Electrical stimulation (e-stim) is a form of passive training used for pelvic floor tone. It involves the use of electrodes to stimulate muscular contractions in the PFMs (Akincilar-Rummer, 2012). E-stim has been reported to improve sexual function and the symptoms of urinary incontinence (Giuseppe, Pace, & Vicentini, 2007; Rosenbaum, 2008). Clinically, electrical stimulation has been found to be helpful for chronic contraction of the muscles around the anus (levator ani syndrome), although not as helpful as biofeedback (Engeler et al., 2013). Akincilar-Rummer disagrees with the use of e-stim for pain stemming from already over-contracted PF muscles. She criticizes misuse of e-stim as part of "cookie-cutter treatment plans with little thought given to whether [it is] appropriate. The major concern with this is that in certain circumstances,

misusing … e-stim may not only be ineffective, it can actually cause a patient's condition to worsen" (Akincilar-Rummer, 2012, para 2). She continues that e-stim should never be used for pelvic floor pain presentations, but only for muscle weakness.

Biofeedback has been described as a way to measure and strengthen the tone of pelvic floor muscles. Biofeedback devices have a pressure sensitive probe that measures muscular electrical activity to gauge intensity of vaginal contractions (Akincilar-Rummer, 2012). It has been used for pelvic floor dysfunction, constipation, incontinence, vaginismus, and chronic pelvic pain (Bassotti et al., 2004; Berghmans et al., 1996; Bo & Sherbourne, 2005; Glazer, Rodke, Swencionis, Hertz, & Young, 1995). While biofeedback can be helpful to improve awareness of pelvic floor strength and reduce pain from vulvar vestibulitis, it has not been shown to improve pain due to scar tissue (Glazer et al., 1995; Rosenbaum & Owens, 2008).

According to Rosenbaum, both active and passive stretching of pelvic floor muscles are part of standard physical therapy protocols to deal with pelvic pain (Rosenbaum & Owens, 2008). For best effect, pelvic floor stretches must be balanced, and use proper "coordination, timing and synergistic recruitment of other core postural muscles, and the ability to relax" (p. 518). Both Forrest and Fontaine suggest that scar tissue must be made flexible and stretching can help tissues tightened by scars to relax and regain former elasticity (Fontaine, 2012; Forrest, 2011). In a Cochrane review, dilators were the only evidence-based stretching therapy found to be useful for stretching vaginal tissue, over-tightened due to scars from radiation therapy (Denton & Maher, 2003). Other research has found that the efficacy of dilators has not been well validated by empirical feedback from cancer patients, and patient compliance has been reported to

be low, even after women received behavioral interventions and education about their proper use (Robinson, Faris, & Scott, 1999; Schover, 2005).

Schover and others have explained that clitoral suction devices have been used to re-awaken sexual sensations in women who have genital and pelvic floor scar tissue after radiation therapy (Schover, 2005; Schroder et al., 2005). She notes that radiation therapy used to treat cervical cancer dates back to over a century ago, and that sexual dysfunction is commonly reported as an outcome. Studies show the use of clitoral suction devices is more successful when combined with vaginal dilators, versus the use of dilators alone, to stretch tissues made tight and insensitive by scar tissue (Schover, 2005; Schroder et al., 2005).

Katz and Marshall have noted that clitoral suction devices have been marketed to older women to address loss of desire and libido (Katz & Marshall, 2003). In her book on pelvic floor health, Hulme states that scant attention has been paid to scar tissue accumulation in the pelvic floor, typical of the aging process (Hulme, 2005). Hulme asserts that without sufficient circulation and exercise, the pelvic floor muscles atrophy, and then degenerate into stiffened, fragile scar tissue. This literature review has found no published investigations of the use of clitoral suction devices, for women without cancer, to increase blood circulation into genital tissues nor into any contiguous tissues such as the PFMs. Hulme suggests increased circulation may prolong the healthy function of muscles of the pelvic floor, which she emphasizes are crucial for balance and gait as women age.

According to Bischof, neuromuscular re-education is central to renegotiating sexual pleasure when working through sexual pain and/or numbness, such as that

resulting from injury-related scar tissue (Bischof, 2012). She explains that women learn adaptive arousal habits and chronic muscular tension as a form of pain avoidance. For example, Bischof suggests that women may learn that certain types of penetration are tolerable, such as inserting a tampon or even the doctor's speculum. However, when it comes to sexual penetration, many studies that suggest that women may learn to associate intercourse with pelvic pain (Bergeron, Binik, Khalifé, Pagidas, & Glazer, 2001; Bergeron, Morin, & Lord, 2010; Seo, Choe, Lee, & Kim, 2005; Ventolini, 2011). Hulme reports that a woman may tense her PF muscles in anticipation of painful sexual penetration, related to negative arousal patterns of the autonomic nervous system, such as over stimulating of the HPA axis (Hulme, 2005). Dogan points out that continued HPA hyperarousal exacerbates existing pain from taut, adhesive bands of scar tissue (Dogan, 2009). Hulme adds that, to compound matters, tight muscles from chronic muscular clenching create ischemia (lack of circulation) and prevent fresh circulation from reaching where it may be needed most (Hulme, 2005). Kobesova and Lewit have noted that when ischemia develops, the propagation of active of scar tissue is a common result (Kobesova & Lewit, 2000).

Sexcorporel is a mode of sexual re-education or re-patterning, developed by Professor Jean-Yves Desjardins at the Sexological Department of the University of Montreal in Quebec in the 1980s. Bischof describes Sexcorporel as "an encompassing view of human sexuality that considers all of the physiological, emotional, cognitive and relational components involved in a sexual experience" (Bischof, 2012, p. 60). She reports that these aspects of human sexuality are each carefully examined as vital components for reconditioning one's sexual self. This process creates the ability to frame

one's sexual experience in a positive manner. She continues that as one becomes free from shame, it is possible to view sexuality as functionally inseparable from pure physiologic arousal and affective, or emotionally driven, release.

Orgasmic Meditation (OM) is another type of sexual re-patterning, developed by Nicole Daedone in San Francisco in the early 2000s (Daedone, 2011). Orgasmic Meditation is described as the deconditioning of sexual expectations and programming through the "goal-less practice" of stroking a woman's clitoris during timed 15-minute intervals (Daedone, 2011; Hamilton, 2015). According to Daedone, in OM practice, orgasm is redefined as inclusive of all emotions and sensations in the woman's experience from the beginning of an interval of practice until its end. She explains that one outcome of this "goal-less practice" is the cultivation of the ability to contain more sensation in one's body (Daedone, 2011).

Sexological Bodywork is a modality that addresses sexual pain, tension, dissociation, and numbness through the process of somatic sexual education, according to Joseph Kramer, founder of this modality (Kramer, 2011). Sexological Bodywork is a method of somatic sex education developed in the early 2000's to expand sexual neuroplasticity (Kramer, 2011). Joseph Kramer developed this modality, creating a certification program in the state of California with Margaret Wade in 2003 (Kramer, 2011; Wade, 2011). According to Kramer, the practices of Sexological Bodywork promote embodied sexual mindfulness, challenge unconscious sexual habits, and provide an opportunity for hands-on, hands-in manual neurological repatterning and re-education (Kramer, 2011).

Each of the three somatically based sex educators listed above define neuromuscular sexual education as a way to repattern sexual response, and include relaxation, enjoyment, mindfulness, and expansion of awareness of one's sexual embodiment as outcomes of their various styles of genital re-education (Bischof, 2012; Daedone, 2011; Kramer, 2011). According to these pioneering somatic sex educators, results of their practices include learning to find more ease in communicating one's sexual experience while asking for adjustments to make sex more comfortable and enjoyable (Daedone, 2011; Kramer, 2011).

Sexological Bodywork: Scar Tissue Remediation

Developed in the early part of the 21st century, Sexological Bodywork is now a recognized (and trademarked) professional certification in the State of California. Sexological Bodywork "offer[s] experiential learning opportunities that consciously access profound ecstatic and erotic states" (Association of Certitied Sexological Bodyworkers, 2014). Joseph Kramer has taught that the emphasis in Sexological Bodywork is on sex education delivered somatically, hands on and hands in the body (Kramer, 2011). Using an integrative and personal approach, contributions to the Sexological Bodywork curriculum as of 2010 allow practitioners to shed important light onto the sexual, emotional, biomechanical, and biochemical problems caused by genital scar tissue (Clements, 2015; Heed, 2017; Johnson, 2013; Kramer, 2011; Samuelson, 2016).

Pelvic pain researchers have called for new assessment and treatment paradigms in order to address scars and every dimension of their effects on health (Arung et al., 2011; Wurn et al., 2009). Sexological Bodyworkers in California and abroad are in a

unique position to offer this set of skills (Heed, 2017; Heed & Johnson, 2016a, 2016b, 2016c, 2016d, 2016e; Kramer, 2011; Kramer 2017). Many Sexological Bodyworkers who practice scar tissue remediation report that the self-help education they offer empowers women to help themselves in addition to any manual therapy offered during session work (Garcia, 2015; Powell, 2015; Samuelson, 2016).

Carter et al. report that a productive therapeutic relationship between care provider and patient is dependent on the quality of their communication (Carter et al., 2010). Wijma and Areskog-Wijma indicate that in order to keep a woman's attention focused on her felt experience, finding an accurate shared vocabulary to describe genital sensations is crucial. Otherwise, habitual cognitive narratives may dominate the client's attention while receiving manual work. Without rapport, trust, and a shared vocabulary, women in clinical settings, especially clinical settings including genital contact, may become distracted from their immediate felt experience, which, according to Wijma and Areskog-Wijma, easily becomes overshadowed by such cognitive narratives (Wijma & Areskog-Wijma, 1987).

Both Kramer and Comeaux suggest that developing a common language to describe sensations is a primary tool for effective somatic and sexual work (Comeaux, 2005; Kramer, 2011). In his paper on Zen awareness and palpation skills, Comeaux describes how an embodied, descriptive, and sensation-driven dialogue with the client is required in order to accurately map any sensations of tension, pain, or other discomfort (Comeaux, 2005). Christenfeld reported that this is particularly true when sensations change from pain to its absence—meaning that mental distractions or the novelty of the session itself may inhibit attention to subtle changes in pain levels (Christenfeld, 1997).

Kramer teaches, and other research supports, that this is especially true during the process of manual work on the vulva or inside of the vagina or anus, because unexamined sexual shame may contribute to the client's dropping into a dissociative state (Almaas & Johnson, 2013; Haines & Newman, 2007; Kramer, 2011; van der Kolk, 2002b).

In a *New York Times* op-ed piece, Peggy Ornstein comments that women have been disenfranchised in regard to understanding the location and function of their genital tissues (Orenstein, 2016). There is a body of evidence to suggest that historically, women have had little anatomical education about the area "down there" (Braun & Kitzinger, 2001; Federation of Feminist Women's Health Centers, 1991; Kramer, 2017; Wijma & Areskog-Wijma, 1987; Winston, 2010). In a report endorsed by ACOG and Women's Sexual Health Foundation, it was suggested that although gynecologists are educated about how to treat female genital pathology, they have little training in talking with patients about the pleasurable possibilities of their patients' genitalia (Hutcherson et al., 2009).

Wijma and Areskog-Wijma suggest that the context of understanding differs significantly between patient and gynecologist. This discrepancy must be negotiated skillfully to empower women to get their questions about sexual matters answered (Wijma & Areskog-Wijma, 1987). In their analysis of how sexual topics were conducted in professional consultations, Weijts, Houtkoop, & Mullen found that "both patients and physicians in gynaecological consultations mark potentially delicate matters by 'expressive caution,' represented by delays, avoidances and depersonalisations" (Weijts, Houtkoop, & Mullen, 1993, abstract).

To complicate matters, there is significant scientific disagreement about the actual anatomy and function of women's genitals. Among today's pelvic floor anatomists, this literature review found substantial and meaningful variations in opinion of the names, locations, and precise functions of vulvovaginal and other genital tissues, including the existence and function of the G-spot (Federation of Feminist Women's Health Centers, 1991; Komisaruk et al., 2004; Levin, 2002; Meston et al., 2004; O'Connell et al., 2005; Puppo & Gruenwald, 2012; Puppo & Puppo, 2015; Winston, 2010; Zaviačič, Zaviačičová, Holomán, & Molčan, 1988b). It seems that women are sometimes denied learning opportunities about the specifics of their genital function. Braun and Kitzinger analyzed and compared definitions of genital terminology and found a discrepancy between favoring location in female genital definitions, and function in male genital definitions in their 2001 study (Braun & Kitzinger, 2001).

Many somatic sex educators and activists have responded to women's disenfranchisement related to the lack of accurate language for describing genital function, location, and sensations by creating a broad spectrum of books, videos, and trainings that speak to this confusing and complex vocabulary (Chalker & Fish, 2002; Federation of Feminist Women's Health Centers, 1991; Gaskin, 1990; Kramer, 2011; Muscio, 2002; Sprinkle, 2004; Sundahl, 2003; Winston, 2010). Wijma and Areskog-Wijma report that although much information is available, women still may not share a common vocabulary to communicate with healthcare providers (Wijma & Areskog-Wijma, 1987). Further, experts agree that women are often shy to speak about their genital sensations openly with any practitioner, or even with their intimate partners (Hutcherson et al., 2009; Wijma & Areskog-Wijma, 1987).

In 1976, Thomas Hanna fathered the discipline of somatics (Schiphorst, 2009). He described the development of somatic education as "self-initiated and self-controlled. However, somatic education has emerged during the twentieth century as a procedure whereby this internalized learning process is initiated *by a teacher who stimulates and guides the learner through a sensory-motor process of physiological change*" (Hanna, 1990, para 1, emphasis added). According to Kramer, the process of genital mapping may be understood as a somatically based teacher/student exchange of information (Kramer, 2011; Kramer, 2017). Kramer and Heed have independently taught that anatomical mapping of genitals is a fundamental tool for somatic education and is used in the context of Sexological Bodywork to establish common genital vocabularies between client and practitioner. This process is used to create a baseline for sensate awareness, and to track changes as client sensitivity changes over time (Heed, 2017; Kramer, 2017).

Sexological Bodywork uses a broad variety of instructive modalities, including breathwork, touch, erotic massage, pelvic release bodywork, genital mapping, Orgasmic Yoga coaching, masturbation coaching, and scar tissue remediation (Association of Certitied Sexological Bodyworkers, 2014). Sexological Bodywork expanded to include scar tissue remediation when Heed joined Kramer to introduce Sexological Bodywork as a new profession in Australia in 2010, and Canada in 2011 (Kramer, 2011). Scar tissue remediation is now recognized as formal addition to the Sexological Bodywork curriculum in Brazil, the US, the UK, and Ireland, Australia and New Zealand, Canada, and Thailand (www.sexologicalbodywork.com). The elements of a typical scar tissue remediation session, including theoretical underpinnings, will be examined within the context of Sexological Bodywork in this section.

Intake and Assessment

Active listening and the birth story. Somatic psychotherapists indicate that active, engaged listening is a powerful tool used in any modality that addresses trauma in order to assess where and what kind of trauma may be held in the body (Haines & Newman, 2007; Levine, 2010, 2013; Minton et al., 2006). During a scar tissue session intake, Heed and Johnson teach that the practitioner must listen actively and carefully to the client (Heed, 2017; Heed & Johnson, 2016e). In 1998, the Adverse Childhood Experiences (ACE) study showed that active listening by medical professionals significantly lowered their patients' number of doctor visits (Felitti et al., 1998; Ogden, 2013).

The work of Porges, Scaer, and Scott, Sauder, and McGettigan suggests that the deliberate use of tone of voice by the therapist helps to set the tone of therapeutic sessions (Porges, 2013; Scaer, 2012; Scott, Saute, & McGettigan, 2010). According to both Porges and van der Kolk, prosody describes the tone of voice used to create calm and confidence, and when well used during active, empathic listening by the practitioner, will contribute to the establishment of client/therapist rapport (Porges, 2013; van der Kolk, 2013). According to trauma researcher Peter Levine, "Our whole organism is wired, from birth, to co-participate, as Daniel Stern says, in each other's *affective internal life*" (Levine, 2013, p. 11). Research supports that our affective internal life is reflected and influenced by vocal prosody, which directly affects mammalian nervous systems via the vagus nerve (Porges, 2013; Porges & Lewis, 2010; Rendall & Owren, 2010).

Levine teaches that establishing rapport using gestural mirroring and prosody has the effect of calming the client, while allowing trust to arise in the therapeutic

relationship (Levine, 2010). Linguistic and polyvagal research indicates that the mirroring use of gesture, in addition to prosody, down-regulates the nervous system (Panksepp, 2010; Porges, 1998; Traunmüller, 2007). Porges, Ogden, and Borysenko emphasize that activation of the ventral vagus nerve stimulates the social engagement system, which contributes to a sense of safety for the client, who may be confronting (for first time) the effects of scar tissue and genital trauma resulting from birth or other genital injury, chronic infection, or surgery (Ogden, 2013; Porges, 1992, 2013).

When problems from scar tissue are suspected as an outcome of childbirth, England, Kudeva, Metzger, and Simkin each report that both storytelling by the mother and active listening to her birth story are an important part of session work (England & Horowitz, 1998; Kudeva, 2015; Metzger, 1992; Simkin, 2007). According to Pam England and others, holding space for the emergence of the birth story is crucial for the client to make meaning of the outcome of her birth experience. This includes any injury or postpartum sexual pain she has suffered (England, 2015; England & Horowitz, 1998; Metzger, 1992; Ogden, 2013; Simkin, 2007).

According to birth companion Penny Simkin, "women tend to remember birth vividly and with deep emotion" (Simkin, 1992a, para 3). In a study that compared the birth stories that women wrote shortly after the birth of their first child with a version of the same event they rewrote 20 years later, "[t]he two birth stories were remarkably alike despite the many years between the two . . . they remembered other personal 'little things' very clearly and described them similarly in the two stories" (Simkin, 1992a, para 5). By recalling the events of her birth story, the client may provide clues about where to assess her body for scar tissue. If, for example there was an episiotomy or C-section:

> The areas where we have been cut into, opened, bled, bruised, torn and otherwise hurt physically or emotionally are not places we immediately return to, much less celebrate, though the stories that emerge from there often redefine who we are and how we move in the world. They are the places where, once we return, we rediscover what it means to be truly intimate and open with ourselves, with another and with life. The body is restructured—and we are redefined—by such experiences, as much as by any physical therapy received. (Osorio, 2001, para 5)

The work of both Simkin and England suggests that a woman's telling of her birth experience is important, so practitioners have an idea of the emotional landscape traversed during childbirth (England & Horowitz, 1998; Simkin, 2004, 2011). Simkin has argued in her published works that details of the client's birth experience are crucial information for the practitioner to understand before beginning physical contact in the context of a hands-on session (Simkin, 2011). Whether the client felt supported while giving birth, listened to, and heard in her requests for information and pain reduction strategies, or whether she felt powerless, confused, shamed, or blamed for difficulties during labor will be important information to help the practitioner to move through the session at an appropriate speed and to help the client re-regulate her affect during hands-on work (Levine, 2010; Simkin, 2011). *Huffington Post* reporter Levinson supports Simkin:

> Trauma produces an intensification of senses and then shuts them down to protect the mind from becoming overwhelmed. And while this is life-saving in the short term, it is soul-numbing in the long term. Those frozen, intense sense memories get encapsulated in the brain and refuse to fade, taking us whirling back in a

> second, unpredictably. Finding a way to a narrative, to connecting the pieces, gives us a way to defuse those terrifying memories, to release the pressure that has built up around them. (Levinson, 2012, para 9)

Research into birth and trauma suggests that once the practitioner has heard the client's birth story, and the client feels she has been accurately heard, hands-on work may begin. If the client feels secure, knowing her story has been accurately heard, this helps her to maintain focus on her body sensations (Porges, 2013; Simkin, 2007). Further trauma research suggests that with this information, the practitioner can more accurately track the client, better managing the pace and intensity of each session (Levine, 2010; Minton et al., 2006).

Boundaries and consent. The ACSB code of ethics states that Sexological Bodyworkers work fully clothed and practice one-way touch (Association of Certitied Sexological Bodyworkers, 2014). Sexological Bodyworkers Pamela Madsen and Betty Martin each suggest that establishing firm, safe boundaries and gaining consent for physical and genital contact before table work begins is critical for this intimate work (Madsen, 2014; Martin, 2014). Sexual abuse expert Staci Haines, and Madsen explain that when working with painful memories, it is doubly necessary to establish trust and to make certain the emotional container for the session is secure (Haines & Newman, 2007; Madsen, 2014). The code of ethics for Sexological Bodyworkers is available in Appendix A of this dissertation.

Sexological Bodywork trainer Caffyn Jesse indicates that making a verbal contract about the content of the session and what the client may expect, either before the session begins or during intake, is an integral part of Sexological Bodywork (Jesse,

2014). In blogs and on their websites, both Madsen and Jesse emphasize that establishing comfort and safety, including what the client is willing or unwilling to experience in terms of touch, is part of the creation of a safe container for the work ahead (Jesse, 2014; Madsen, 2014). Jesse adds that if the client changes her mind and wants to change the parameters of the session, it should be acknowledged. In cases when the client is facing overwhelming feelings, the session can be renegotiated to allow the client to feel comfortable (Jesse, 2014).

According to Sexological Bodywork educator Betty Martin, work with the sexual body inevitably brings up the question of boundaries, and sometimes the entire session or even a series of sessions can be devoted to negotiating, making, and observing boundaries (Martin, 2014). Both Martin and Haines suggest that when there has been a history of boundary violations and sexual abuse, it may be useful to explore a series of sessions that are wholly controlled by the client (Haines, 1999; Haines & Newman, 2007; Martin, 2014). Martin describes how these sessions, focused on a variety of ways to make and maintain boundaries, are constellated around whether, how, or when the client will permit touch, the distance of the therapist from the client, and how the therapist approaches the table (Martin, 2014).

In their paper exploring women's sexual difficulties through hands-on treatments, Cacchioni and Wolkowitz suggest that explaining hands-on protocols before the client gets onto the table is an important part of any hands-on work, including scar tissue remediation sessions. Haines and Cacchioni and Wolkowitz agree that clients who have been traumatized during a birth experience or by sexual abuse may be sensitive to or fearful about genital contact (Cacchioni & Wolkowitz, 2011; Haines & Newman, 2007).

Certain medical doctors and nurses agree with these findings. They submit that in order to calm hypervigilance, a thorough explanation of what to expect may be warranted (Bates, Carroll, & Potter, 2011; Cacchioni & Wolkowitz, 2011; Price, 2005). Cacchioni and Wolkowitz argue that this explanation is important while the client is still clothed and sitting comfortably. Explanation well ahead of time will land far differently than a brief explanation of what is about to happen once the client is lying down, and although draped, may be feeling naked and vulnerable on the table (Cacchioni & Wolkowitz, 2011).

Moving into contact on the table. Craniosacral trainers relate that before moving into physical contact, it is useful to come into a state of congruent energetic resonance, or physical rapport with the client (Milne, 1995a; Sills & Degranges, 2001). Milne describes how this is accomplished through synchronizing the rhythm of breath between practitioner and client, and may be done either sitting at the head of the table, or standing beside it, within the client's sightline. The practitioner's hands may be resting on a neutral place on the client's body, or by his or her own sides (Milne, 1995a).

Osteopathic, Structural Integration, and chiropractic theories indicate that tight muscles at the back of the neck are suggestive of occipital compression at the top of the cervical spine. This may lead to compression or torsion of the dural tissue and cranial nerves, including the vagus nerve (Magoun, 2001; McPartland & Brodeur, 1999; Medici, 2015b, 2016a; Upledger, 1987; Winter, Schleip, & Stucker, 1999). Medici emphasizes that compression or torsion of the dural tissue may increase overall sympathetic activation of the client, making it difficult for the client to relax (Medici, 2016a). He adds that compression of the vagus nerve will affect its output (Medici, 2011b, 2013b).

Osteopaths agree with Medici: In order to ease internalized tension and hyper-vigilance, it is important to assess and release excess tone from the posterior cervical muscles, and thereby, bones they attach to that may compress the vagus nerve (Becker, 1997; Magoun, 2001; Milne, 1995b). Both Milne and Medici have taught that neck tension may be created by pre-existing tension in jaw muscles, which cue the deep muscles of the neck (Medici, 2011b, 2013b, 2015b; Milne, 1995b). Medici also teaches that as during first table contact, a thorough assessment of the tension in the posterior cervical muscles is important to determine the general tone of the nervous system as a whole (V. Medici, personal communication, March 24 2000).

Research across a broad variety of disciplines suggests that chronic compression of the vagus nerve contributes to generalized myofascial tension, pain syndromes, and bowel dysfunction (Buttagat, Eungpinichpong, Chatchawan, & Kharmwan, 2011; Cohen-Lewe, 2013; Giles, Hensel, Pacchia, & Smith, 2013; Kharrazian, 2013; van der Kolk, 2013). Trauma specialist Peter Levine and craniosacral trainer Franklyn Sills have found that during work with the body—and Medici specifies that, especially during work with the posterior cervical muscles—shaking and trembling may arise as a result of the body re-organizing itself. As this occurs, the trauma response releases and attenuates through the nervous system (Levine, 2010, 2013; Medici, 2013d; Sills & Degranges, 2001).

Sills notes that trembling during trauma release may be quite palpable or very subtle (Sills & Degranges, 2001). Levine suggests that it is very useful to read autonomic and visceral signals while tracking each client's nervous system (Levine, 2010). A number of somatic practitioners have contributed that local skin temperature, a gurgle from the belly, a flush of color on the skin of the face, a veil of light perspiration, pupil

dilation and the depth of the breath are all available for observation to the attuned practitioner (Levine, 2010, 2013; Ogden, 2013; Sills & Degranges, 2001).

From both osteopathic and chiropractic perspectives, after assessing relative autonomic activation in the client, it is useful to determine the mobility and motility of the bony structures of the cranium and pelvis (Becker, 1997; Magoun, 2001; Medici, 2013b, 2015b; Milne, 1995a, 1995b). According to Milne, an effective and primary question is, "what's moving, and what's not moving?" (Milne, 1995a). Both Milne and Sills suggest that this question may arise continually during the examination and assessment process in order to understand where and what kinds of restrictions are present in the cranium, the pelvis, and the soft tissues of the pelvic floor (Milne, 1995b; Sills & Degranges, 2001). From the perspective of both craniosacral work and visceral manipulation, this question can be posed about bone, ligament, muscles, or fascia, in order to accurately locate and palpate any tissue restriction due to scars or adhesions (Barral, 1993; Medici, 2011a, 2013d; Milne, 1995a, 1995b).

The Use of Breath

Kramer has stated that breath is a primary focus in Sexological Bodywork (Kramer, 2011). Sexological Bodyworkers teach that breath is used to modulate arousal, both of the nervous system and of the sexual trajectory of the client (Jesse, 2014; Kramer, 2011). From the perspective of Forrest Yoga and certain other yoga schools, use of breath in the context of working with physical or emotional scar tissue involves working through layers of emotions (Ballentine, Hymes, & Rama, 1998; Forrest, 2011). According to yoga teacher and yoga professional trainer Ana Forrest, physical sensations that encompass fear and shame are held unconsciously in the body (Forrest, 2011).

Forrest emphasizes that attention to breath is a primary tool to track through both feelings and sensations:

> Breathe down deeply as you let the waves of emotion come up and through you. An emotional release might show up as trembling, fear, tears, anger, or a desire to get up and bolt. Be curious about what's in that part of you. As the visceral sensation fluctuates, stay steady. Keep connecting to the visceral as well as the emotional feeling. Don't run away. Give yourself permission to feel the emotion. Keep breathing into the stretch, relaxing layer by layer with each exhale. Be brave enough to feel what's stuck in there and let it move. (p. 24)

Both Forrest and Jesse agree that yoga teachers and Sexological Bodywork practitioners provide guidance to clients or students to stay consistent in attention to their breath, and to remain present with any emotions that emerge as the session progresses (Forrest, 2011; Jesse, 2014). Levine, Macnaughton, and others suggest that the breath can be used as a tether, connecting the clients' emotional experience to their attention to the present moment in order to move them toward a sense of wholeness (Forrest, 2011; Kushnir, 2008; Macnaughton & Levine, 2004; Milne, 1995a). Many trauma experts agree that the practitioner must track accurately, staying mindfully attentive to their clients. As this occurs, clients can be cued to engage their attention in the depth, intensity, and speed of their own breath when emotional distress or pain arises (Forrest, 2011; Jesse, 2014; Levine, 2010; Macnaughton & Levine, 2004; Scaer, 2012).

Somatic and meditation experts have taught that the diaphragm and its excursion can be viewed as a kind of bridge leading from somatic dissociation to a state of embodied mindfulness (Forrest, 2011; Medici, 2013e; Ray, 2002). Visionary osteopath

Robert Fulford suggests that the breath serves as a unique bridge between the body and mind:

> Breathing is the only vital function, which, in spite of its independence from our normal consciousness, and its self-regulating and self-perpetuating subconscious character, can be raised into conscious function, accessible to the mind. Due to this double nature, breathing can be made the mediator between mind and body, or the means of our conscious participation in the most vital and universal functions of our psychosomatic organism (Cisler & Fulford, 2003, p. 65)

Broad consensus exists among many somatic disciplines about accurately tracking the full range of motion of the breath. This serves practitioners in the examination of exactly where it is moving (or not), indicating potential blockage from abdominal adhesions, scar tissue, or other problems in the client's abdominal cavity (Ballentine & Hymes, 1998; Cisler & Fulford, 2003; Forrest, 2011; Jesse, 2014; Milne, 1995a).

Forrest and others have observed that if there is scar tissue from a C-section or other abdominal surgery, the movement of breath may be restricted by the spread of adhesions through the intestines, intercostal and abdominal muscles, including the diaphragm itself (Bond, 2007; Forrest, 2011; Loupos, 2011; Newton, 1997; Rolf, 1989; Wurn et al., 2009). Medici, Kramer and Jesse explain that expanding the range of movement of the breath as the session progresses is one way to move from working therapeutically to an expansion of the parameters of the session to include autonomic and sexual arousal (Jesse, 2014; Kramer, 2011; Medici, 2013d, 2013e). Heed has taught that this may become the goal of future Sexological Bodywork sessions, once the

fundamental step of scar tissue remediation has been successfully accomplished (Heed, 2017).

Mindfulness

According to 20th-century osteopath Robert Fulford, breath is the mediator between mind and body, allowing somatic awareness to arise and transform from an unconscious, vegetative process to conscious awareness (Cisler & Fulford, 2003). There is a broad variety of literature to support that breath has been traditionally used as a primary tool for developing mindfulness in Eastern meditative traditions ranging from Sufism to Buddhism and Hinduism, and across virtually all forms of yoga (Feuerstein, 1997; Forrest, 2011; Iyengar, 1992; Trungpa, 1976; Vago & Silbersweig, 2012).

In Sexological Bodywork, breath is central to connecting one's sense of embodiment to one's own genital awareness (Kramer, 2011). Taoist Erotic Massage is a breath-driven mindfulness practice developed by Joseph Kramer, taught worldwide in Sexological Bodywork trainings, which relies on continuous deep breathing while receiving genital touch (Kramer, 2011). In his doctoral dissertation Kramer reports that one common outcome of this practice is a deep dive into states of expanded awareness (Kramer, 2002). Kramer elaborates that in this novel use of breath, the breath itself becomes the primary tool for developing a mindful connection to one's genital experience and autonomy. The practitioner verbally guides the receivers of genital contact to stay connected to their breath, while re-examining old habits of tension, using deliberate muscular clenching, and then letting go, as a way to increase one's mindfulness and ability to contain increased sensation.

Neurobiology suggests that one way to define mindfulness is as a refinement of proprioceptive awareness (Siegel, 2010). Gardner-Abbate teaches that this is true for both practitioner and receiver of touch, in the form of palpatory diagnosis and feedback. She points out that increased palpatory sensitivity is required to monitor movement of *qi* through the body (Gardner-Abbate, 2001). According to Medici, one of the central goals of holistic practice and manual therapies is to increase all clients' sensitivity to the flow of their own *qi*, as well as that which causes its blockage (Medici, 2012b, 2012c, 2013d).

Taoist sex educator Mantak Chia states that the ability to increase one's capacity for containing sensation builds mindfulness of *qi*, the body's essential life force (Chia, 1986; Chia & Arava, 1996). According to many somatic educators, the Chinese concept of *qi*, or life force, is not abstract, but is felt as palpable sensation (Low, 2009; Medici, 2013d; Zhou & Benharash, 2014). Shiatsu and acupuncture texts suggest that the free movement of *qi* can be defined as a sensation that flows throughout the meridian systems of both practitioner and client (Dubitsky, 1997; Kaneko, 2010). However, citing O'Connor and Benki's classic translation of the popular textbook, *Acupuncture, a Comprehensive Text*, Finando and Finando add it is important to understand that "qi is an untranslatable word in the Chinese medical lexicon. It signifies a tendency, a movement, something on the order of energy" (Shanghai College of Traditional medicine, 1981). And Birch and Felt (1999) point out that:

> Our inevitable Western search for the material or energetic basis of qi need not look for something that is strong enough to perform work. We can look instead for signals that stop, start or moderate a process. In this regard, the closest parallel to qi in Western thought is a generative matrix in which all things interact with all

> other things through the exchange of information. (Finando & Finando, 2011, p. 172)

This maps quite closely to the parallel definitions of holism and fascia (Still, 1899; Lawrence & Weisz, 1998). Becoming mindful of the movement of qi or life force energy can be defined as goal of both Sexological Bodywork, and scar tissue remediation work. Kramer teaches that one of the goals of Sexological Bodywork is to increase the client's sexual mindfulness while on the table as well as afterward, and the work of both Schleip and Medici suggests that when proprioceptive mindfulness is activated and subsequently refined, it becomes possible for the client to notice changes in her own sensation, including sensation of *qi*. They note this is possible when connective tissue conductivity increases, and stiffened scar tissue changes its conformation (Kramer, 2011; Medici, 2015c; Schleip, 2012). Concurrent with noticing increases in this proprioceptive sensitivity, research in connective tissue science has found physical changes in local tissue pH and heat transfer, after manual pressure and friction alter both palpable character, and viscosity of fascia (Rodríguez & del Río, 2013; Thomas & Klingler, 2012; Tozzi, 2015a, 2015b). The work of both Pischinger and Schleip suggests that changes in the viscosity of fascia free up restrictions on nerve endings and other proprioceptors (Pischinger, 2007; Schleip, 2003b, 2003c). Both Medici and Heed have taught that, without changes in adhesions that restrict nerve flow and proprioceptive conductivity, the goal of increased sensation and embodied mindfulness is difficult to realize (Heed, 2017; Medici, 2011a).

Mindfulness is the first step toward re-association and has been suggested as a beneficial practice to increase interoceptive awareness (beneath one's own skin) of sexual

stimuli (Silverstein, Brown, Roth, & Britton, 2011). Multiple studies have found that pain, including sexual pain, is relieved by mindfulness practices (Basson & Smith, 2014; Brotto, Basson, Smith, Driscoll, & Sadownik, 2015; Kabat-Zinn, 1982; Kabat-Zinn, Lipworth, & Burney, 1985; Kabat-Zinn, Lipworth, Burney, & Sellers, 1987; Kushnir, 2008). Heed and Johnson maintain that pelvic floor and genital mapping may be viewed as a somatic practice to increase embodied mindfulness. Only after scar tissue and its blockage to proprioception is remediated, is overcoming the dissociation that Almaas and Kramer have described as "the genital hole" a possibility (Almaas & Johnson, 2013; Heed & Johnson, 2016e; Kramer, 2003; Kramer, 2011).

Genital Mapping

A broad variety of disciplines use many levels of mapping, from energy mapping in collective social dynamics, to anatomical mapping, sensation mapping, emotional mapping, *qi* mapping, and the functional mapping of scar tissue (Bradley & Pribram, 1998; Heed, 2017; Lindhard, 2015; Low, 2009). Kramer suggests that mapping is a process used to promote sensate learning in the body, including learning about genital sensation and function (Kramer, 2011b Kramer, 2017). Writings about women's reproductive and genital health find that women frequently do not know enough about the function and location of their sexual arousal network to understand how scar tissue impacts their sexual experience (Chalker & Fish, 2002; Federation of Feminist Women's Health Centers, 1991; Gaskin, 1990; Heed, 2017; Muscio, 2002; Sundahl, 2003; Winston, 2010; Wolf, 2012).

As described earlier in this section, many Sexological Bodyworkers seek to provide a starting place to address genital ignorance or dissociation through the practice

of genital mapping (Heed, 2017; Kramer, 2011; Kramer, 2017; Pelmas et al., 2016). Both Heed and Johnson teach that genital mapping is a method used to empower women with a history of birth-related trauma, by providing a safe way to experience their bodies while in the care of an experienced practitioner (Heed & Johnson, 2016e). In their online video series, Heed and Johnson describe it as the job of the practitioner to attend to each woman's questions and emotions using a process that provides accurate information and mindful presence (Heed & Johnson, 2016a, 2016b, 2016c, 2016d, 2016e).

Kramer teaches that during their training, Sexological Bodyworkers learn somatically as well as didactically (Kramer, 2011). In his training manual, he explains that Sexological Bodywork training includes participating in hands-on, hands-in genital mapping exchanges. Anatomical mapping of women's genitals is a process that seeks to address the problem of the lack of functional sex education for women, by providing Sexological Bodyworkers and their clients with a systematic approach for the identification, location, and function of each of the many kinds of tissue in the vulvovaginal area (Kramer, 2011; Kramer, 2017).

See Appendix B for mapping scripts used in Sexological Bodywork training. At the inaugural Sexological Bodywork training in Australia in 2010, Heed contributed genital anatomy mapping scripts to the curriculum, used during this as well as subsequent practitioner trainings. In the context of a professional training, group genital mapping exchanges are led by an instructor who describes in detail the bony landmarks, genital locations, orifice locations, and mucosal membrane surfaces present in the vulvovaginal region (Heed, 2017; Kramer, 2011; Kramer, 2017). In Heed's mapping scripts, erectile tissue beds, mucosal tissues, organ and orifice locations, and sources of lubrication and

engorgement are defined and explored during a hands-on hands-in anatomical mapping session. The emphasis is on providing as much usable information about normal healthy sexual function, and the potential for arousal as the client needs to better understand her body (Heed, 2017; Heed & Johnson, 2016d).

According to Heed and Johnson, one important aspect of mapping is locating and describing the sensation (or lack thereof) in, on, or around any scar tissue that may be present (Heed & Johnson, 2016b; Pelmas et al., 2016). In online professional forums, Sexological Bodyworkers report success by using mapping as a technique for working with genital numbness:

> Mapping is the tool that I use most. The majority of my experiences of women with numbness have been with women after gynecological surgery or sexual trauma or birth trauma who can't feel specific areas of their vagina or vulva or even anything below their belly. I go slowly step by step and listen for what the body has to say. Often the numbness is coupled with dissociation and so when we find the moment of dissociation or image or sensation, feeling starts to return. Sometimes the source is biomechanical or scar tissue (blocked nerves or trapped tissue) in which case dissolving the scar tissue together with presencing and mirroring is what has given me the best results. (Johnson in Pelmas et al., 2016, para 1)

As described previously in this review of literature, a process that biophysicist James Oschman has called “somatic recall,” it is common for bodyworkers of all types to encounter emotional responses when palpating the tissues of their clients (Oschman & Oschman, 1995a, 1995b). Others concur, describing somatic recall and tissue memory as

common events noticed by many kinds of somatic practitioners (Comeaux, 2005; Gardner-Abbate, 2001; Scaer, 2005; Spiegelman, 1992; Tozzi, 2014). Heed and Johnson have suggested that mapping can also be used for locating areas of contained or sublimated emotional distress resulting from a traumatic event (Heed & Johnson, 2016e). According to Haugstad, women with chronic pelvic pain report a feeling of the abdominal region being a taboo area, which they would avoid touching and even moving. They had experiences of their whole body being painful, with no pleasurable sensations left. They also reported lack of contact and lack of control over whole regions of their bodies (Haugstad et al., 2006).

This condition is an example of a state described by first Hanna and then Kramer, as sensory motor amnesia (Hanna, 1980; Hanna, 1990; Kramer, 2011). The earlier quotation from the Sexological Bodyworker's professional forum suggests that re-association to the abdomen, including the pelvis, is an informational experience (Pelmas et al., 2016). The mapping process might be a first step toward the alleviation of pain for women like the ones mentioned in Haugstad's study above (Haugstad et al., 2006).

Castor Oil from *Ricinus communis*

Use of castor oil to treat internal vaginal, internal anal, abdominal, and other genital scars was introduced by Heed in the inaugural Sexological Bodywork training in Australia in 2010. According to many scholars, castor oil has a long history of human use, dating back to the Egyptian Ebers papyrus in 1500 BCE, and the Ayurvedic text Suhsruta Samhitha dated between the first millennia BCE, and 500 CE (Bryan, 1930; Kulkarni & Ramanamurthy, 1977; Short, 2009; Tipton, 2008; Tunaru, Althoff, Nüsing, Diener, & Offermanns, 2012). In Egypt, castor oil has been documented for its use as a

mummification balm (Tchapla, Méjanelle, Bleton, & Goursaud, 2004). Other uses for castor oil in ancient Egypt reportedly included labor induction, skin healing, and its use as a laxative (Aboelsoud, 2010; Azhari, Pirdadeh, Lotfalizadeh, & Shakeri, 2006; Kelly, Kavanagh, & Thomas, 2013).

In the Ayurvedic tradition, references to the cultivation of castor plants date as far back as 4000 BCE and document its use as a therapeutic agent for cleansing vaginal tissue (Dash, 2001). The writings of Gabbey and Tirtha document that other uses of castor oil in Ayurvedic medicine include treatment of inflammatory skin conditions, abscesses, headache, and middle ear infection. Its use has also been reported for healing vaginal lesions, promotion of lactation, and for vaginal infections, both in Ayurveda and among Canary Islanders (Gabbay, 2010; Tirtha & Uniyal, 2007). Ricinoleic acid is reported to be the active ingredient in castor oil, and has antifungal (Bhakta & Das, 2015; Kumar, Kshitij, & Nishteswar, 2013), anti-inflammatory (Jena & Gupta, 2012; Vieira et al., 2001; Williams, 2012), antibacterial (Kota & Manthri, 2011; Nada et al., 2015; Yari, Yeganeh, Bakhshi, & Gharibi, 2014), antioxidant (Phukan, Bawari, & Sengupta, 2015), analgesic (Azeem & Nada, 2015; Rana, Dhamija, Prashar, & Sharma, 2012), and hepatoprotective properties (Chauhan, 2015; Jena & Gupta, 2012).

There is abundant documentation of the use of castor oil in midwifery practice. Castor oil has been well documented to induce labor when taken orally (Azhari et al., 2006; Garry, Figueroa, Guillaume, & Cucco, 2000; Kelly, Kavanagh et al., 2013; Tunaru et al., 2012). Midwives anecdotally report that it has also been used to ripen the cervix prior to labor (S. Shealey personal communication, September 2, 2013). There is also documentation to support its use to break up scar tissue in the os (cervical opening) from

prior scar-inducing procedures, including dilation and curettage after C-section, and cervical biopsy (Kelly, Kavanagh et al., 2013; Tunaru et al., 2012). The inclusion of castor oil in wound dressings has been documented to speed the healing of scar tissue for post-mastectomy and other post-surgical patients (Babycos, Barrocas, Mancuso, & Turner-Marse, 1990; McDougall, Franklin, Gresle, & Long, 2005).

In the first half of the 20th century, visionary healer Edgar Cayce was reported to have recommended the use of castor oil frequently during distance trance readings for those who sought his help (Reilly & Brod, 1975). McGeary and others document that during these trance-states, Cayce suggested the efficacy of castor oil packs to increase lymphatic drainage (Gabbay, 2010; McGarey, 1970, 1993; McMillin, Richards, Mein, & Nelson, 1999; Reilly & Brod, 1975). There has been little formal study to substantiate Cayce's health claims, but the efficacy of his treatments and ensuing reputation were such that he is referred to as the father of American holistic medicine (McMillin et al., 1999). What has been substantiated beyond question is that castor oil has a rich and extensive history of folk use: as a laxative (Gabbay, 2010), an analgesic (Kota & Manthri, 2011), a soother of ulcerated mucosal membranes (Kumar et al., 2013; Noble, Carr, & Gonzalez, 1989), a treatment of uterine fibroid tumors (Buhrman, 1996), a treatment for vaginal lesions (Dash, 2001), and a treatment for abdominal strictures and adhesions (Patel, 2011).

CHAPTER 3

METHODS

Research Approach

The purpose of this research was to explore scar tissue as a cause of sexual pain, and to develop, describe, and disseminate protocols for clinical and self-treatment. It contributes to an emerging body of knowledge about the causes, effects, and resolution of painful sex due to genital scar tissue, as a result of childbirth.

Research was carried out with the help of my colleague Jaiya. She is referred to hereafter as Kinzbach. Kinzbach's initial personal experience, and later, her participation with a group of research subjects, provided the inspiration and working model from which we explored the development of a treatment approach for birth-related painful sex.

In order to address all aspects of genital and pelvic floor scar tissue, a research paradigm independent of traditional top-down medical models was required. Drawing inspiration from the work of Kellogg-Spadt and Humphries, Mertens, and Truman, we pursued an emancipatory research paradigm (Humphries, Mertens, & Truman, 2000; Kellogg-Spadt, 2002). Our research paradigm was a mixed methods approach that included methodologies common to education, health care, and transpersonal psychology. The methods we chose sprang from a rich history of embodied learning, social activism and critique, and included participatory action research (PAR) and intuitive inquiry (II).

Participatory Action Research (PAR)

As its name implies, participatory action research is about participation, action and research. It is suitable for use in a normal work environment (Allen, 2000; Coghlan

& Brannick, 2005; Dick, 1993). Action research has a history of application as a research methodology in healthcare settings (Laur & Keller, 2015; Meyer, 2000). We found that collecting data in our normal work setting as clinicians in private practice was essential. We believed we required as normal a work/research environment as that which produced the startling result that initiated this critical investigation. In our normal hands-on working environment, sexual health is examined, taught, and treated. This environment was necessary in order to test whether the remarkable and positive changes we observed during Kinzbach's initial three sessions were generalizable to a larger population (see Kinzbach's story, page 274).

Action research is a pragmatic methodological approach that leads to the development of participatory learning processes utilizing the talents, insights, and input of all involved, whether subjects or researchers (Brydon-Miller, Greenwood, & Maguire, 2003; Coghlan & Brannick, 2005; Heron & Reason, 1997). We chose to pursue a peer-based participatory action research model rather than propagate a more conventional power differential between "experts" and "subjects." Referring to the writings of Heron, Humphries, Mertens, and Truman claim that:

> The basic explanatory model for research behavior (in both researcher and researched) is that of intelligent self-direction—commitment to purposes in light of principles—combined with relative determinism. Subjects become co-researchers, since if they are not privy to the research thinking, they will not be functioning as intelligent agents. A central idea here is the notion of intentionality—in any action, people are conscious of the purpose of doing what they are doing, their meaning in acting. In collaborative research, such intentions

> are available mutually to the researcher and research participants. (Humphries et al., 2000, p. 3)

We wanted to challenge the perception of professional distance between researchers and subjects, typical of positivist research methodology. How our research approach differs from traditional reductionist/positivist methods may be best described by what action research is not:

> Action research is not about doing research on or about people, or finding all available information on a topic looking for the correct answers. It involves people working to improve their skills, techniques, and strategies. Action research is not about learning why we do certain things, but rather how we can do things better. (Ferrance, 2000, p. 2)

Collection and quantification of objective data are reported to be difficult when examining somatic processes and perceptions (Anderson, 2008; Fourie, 2012; Simmonds, Miller, & Gemmell, 2012). This is particularly true when documenting somatically sensed changes in pain levels, and perhaps more so when that pain is sexual in nature. These changes are subjective, and in the case of our research, often based on subtle shifts in autonomic balance. Attempts at quantifying sexual pain have met with varying degrees of success. As stated in Chapter 1 in Definitions, the newest edition of the DSM collapsed several entire sexual pain diagnostic categories together due to problems with consistency in research methodologies, when examining women with sexual pain (see Definitions, Chapter1) (Perez & Binik, 2016). These conventional research methodologies rely on:

> Control, standardisation, objectivity, and the use of numerical and statistical procedures. This sacrifices flexibility during a given experiment—if you change the procedure in mid-stream you don't know what you are doing to the odds that your results occurred by chance. In action research, standardisation defeats the purpose. The *virtue* of action research is its *responsiveness*. It is what allows you to improve both action and research outcomes through a process of iteration. As in many numerical procedures, repeated cycles allow you to converge on an appropriate conclusion. (Dick, 1993, para 42–44)

It was our experience that the women we worked with were already knowledgeable about their own bodies and their own pain. Action research methods honored each woman's knowing and participation in her own healing through dialogue processes that included detailed descriptions of her somatic experiences, sharing intimate details of her sexual history, as well as her birth story. We added the use of somatic teaching and learning to our research methodology, adapting action research for use in this novel research application. We called this adaptation somatic action research (SAR).

Without the comfortable environment fostered by the egalitarian relationship between us as investigators, and the women who participated in this project, we believed we could not expect full compliance or participation in our research. The highly personal and vulnerable nature of the material provided to us by each woman created a deep need for trust in the research environment. As clinicians, we sought to educate each subject by changing her perception, self-treatment of, and context for scar tissue as one cause of painful sex. We were confident that our position as Sexological Bodyworkers, and in my

case, a specialist in scar tissue remediation, qualified us to do this work. This was supported by Findley's notion:

> Clinicians do research every day. When they see a patient and make a diagnosis they develop a hypothesis of why the patient is not functioning optimally. Prescribing treatment is essentially designing a study with an intervention. When a patient returns for a follow up appointment, the practitioner is collecting data and testing the initial hypothesis. The practitioner will evaluate outcome [sic] and either discontinue, prescribe more or new treatment. (Findley, 1989, para 1)

Cycles

Participatory action research is a process-driven paradigm based on a series of four steps that become iterative as the process progresses (Allen, 2000; Coghlan & Brannick, 2005; Dick, 1993; Ferrance, 2000). Prior to initiating this four-step iterative cycle, a real-world problem to be solved, and its context, must be identified (Coghlan & Brannick, 2005). Once the problem and desired outcome are identified, the first step of the cycle is making an inquiry specific to solving the problem. The next step is planning an action, or an intervention to be executed. The third step is the execution of the action or intervention. In the fourth step, the outcome of the action is evaluated. The first step of the next cycle is the generation of a new inquiry. This fresh first step initiates the next iteration, including new planning, a new action or intervention, and its subsequent evaluation. Cycles are repeated in an evolutionary, upward spiraling fashion, and each new inquiry is acted upon and evaluated until the original problem is solved (Brydon-Miller et al., 2003; Coghlan & Brannick, 2005). See the illustration of a single PAR cycle in figure 3.1.

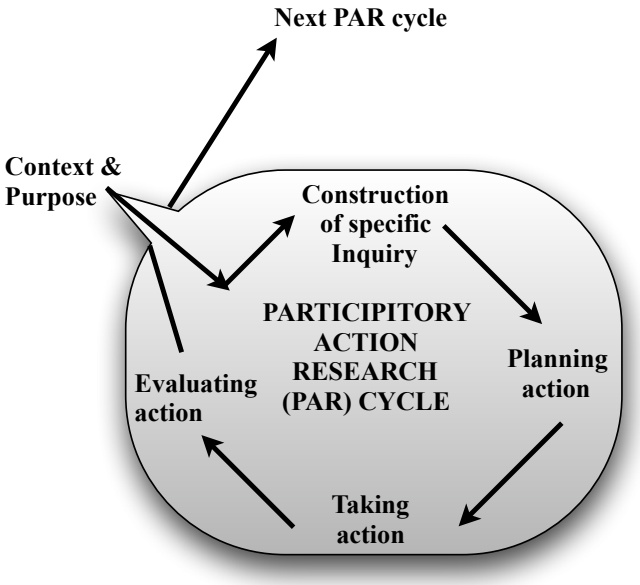


Figure 3.1. Participatory action research: Template for a single Participatory Action Research (PAR) cycle. Adapted from *Doing Action Research In Your Own Organization* by D. Coghlan & T. Brannick, Sage Publications, 2014.

Context

In action research as it is defined by Coghlan, one critical step precedes the four iterative phases of action research cycles. This preliminary step is one of providing a context for the problem(s) to be solved (Coghlan & Brannick, 2005). As such it requires determining the value of the research to be carried out, who the stakeholders are, the obstacles to the research, and the amount of time that will be needed to carry out the research. The final question in setting the context for the action research cycle is: What is the contribution to knowledge derived from the action research process?

During our investigation, scar tissue and its relative position within the Four Domains of health for each subject provided a context for five such action research cycles. Eventually the use of these cycles provided five distinct inquiries. These

eventually became utilized to develop five separate thematic protocols for scar tissue remediation, illustrated below in five case studies.

The use of action research as a tool generated an examination of our beliefs about what was needed for successful scar tissue remediation. In order to examine and test our beliefs about the problem of scar tissue, its context, and our purpose, we constructed a number of inquiries, which we were able to test with the participation of our subjects. We conducted a series of three sessions with each of twelve women. Actions taken were evaluated with participation of both researchers and subjects. Subjects reported their experiences after each session as part of the intake for the following session. An exit interview was conducted for most participants, and in some cases, a final interview and testimonial was filmed. The relationship between the problem, its context and PAR cycles is drawn in figure 3.2:

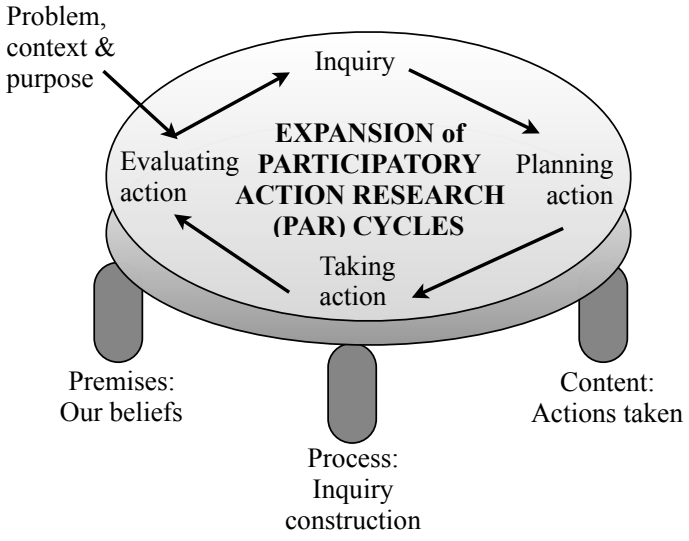


Figure 3.2. Participatory action research: Expansion of Participatory Action Research (PAR) cycle, for development of a specific knowledge base. Adapted from *Doing Action Research In Your Own Organization* by D. Coghlan & T. Brannick, Sage Publications, 2014.

Somatic Action Research (SAR) and the Four Domains

The next section details how the iterations of action research are utilized pragmatically in my professional life as a bodyworker. The constant driver of my professional inquiries is the use of the Four Domains of health. Action research is an accurate descriptor for how I have learned to work organically, since I began a full-time bodywork practice.

Action research is an elegant method to contextualize, inquire, plan interventions, apply techniques, and measure efficacy for the physical interventions I use to alleviate tension and pain. What makes my bodywork practice unusual is that I offer this holistic methodology to differentiate and distinguish one kind of tension compared to another, and in so doing educate and empower my client. Over the course of 10 years in practice prior to initiating this research, I practiced this method unknowingly, working with thousands of clients with different bodies, each of whom came to me seeking relief.

Inquiry. When I work hands-on, I continually pose questions for investigation during every session I conduct. Using the Four Domains of health as a point of reference, I use all my senses to understand the tissue of the person I am touching, and make an internal inquiry into the nature of the tension I encounter. Connective tissue density is a factor I investigate at the beginning of table work with each of my new clients. I assess for overall connective tissue (CT) density by palpating several areas on the body, feeling for the difference between biomechanical resistance and connective tissue resiliency in each chosen spot. I get an overall sense of the kind of CT I am working with (dense, strong, and collagenous; weak, mobile and elastic; in between these two extremes?). Knowing that each client's particular CT density will influence every other somatic

inquiry I will make, this inquiry supplies a preliminary context for the bodywork that lies ahead. Connective tissue that is dense will conduct sensation more slowly than CT that is highly flexible and easily mobile. I consider CT typology to be governor of the domain of biomechanics.

Biomechanical tension feels like the body I am touching is taking the shape of a postural habit and is expressing that shape, even while lying supine on my table. This is true regardless of connective tissue density. I can feel how repetitive strain (athletic training, work habits, driving habits, etc.) and postural habits (forward head carriage, exaggerated low back curvature, internal shoulder rotation, etc.) are contributing to a person's postural shape. For example, if people have spent too much time sitting, their hip flexors and quads will be short and tight, and their hamstrings will be tight and adhered together from the pressure of contact with a chair.

In another example, if a mother is breastfeeding, her shoulders will begin to round forward into the shape of cradling the baby to her for feeding. Her chest muscles are tight, and the muscles between her shoulder blades feel stringy and fatigued. How do I know the muscle is fatigued? It is a particular sensation: The muscle has a vibratory signature, which quivers distinctly when compared to other causes of shakiness. I learned to sense these myofascial vibratory signatures during my bodywork training with Dr. Medici. This happened as I assisted him over 10 years of teaching deep tissue seminars, a part of post-graduate bodywork training at SMSC. I became confident in my perceptions after years of inquiry and experience.

Biochemical tension can present to inquiring fingers with a kickback reaction from the tissue as it is palpated: I press in, and it kicks back like a tiny sharp spasm. I

associate this kickback response with biochemical imbalance or over-saturation with a chemical insult of some kind. For example, when clients drink too much coffee prior to their session(s), muscles of the neck may kick back against my fingertips when I am working with trapezius or posterior cervical muscles.

Conversely, biochemically imbalanced tissues may also have a thick and fudgy feeling, like touching warm, overly soft play-dough. My fingers sink in, but there is little resilience, and the client may feel a painful, almost bruise-y feeling as my fingers press into the flesh. This non-resilient tissue response indicates a systemic problem with blood chemistry, due to blood that is overly viscous. In another example, years taking the birth control pill are readily palpable as an over-resilient, rubbery resistance to mild finger pressure at the posterior neck muscles, back of the skull, or trapezius.

Emotional tension is palpable when the muscle I am touching retracts from my fingers on contact, as if ticklish. During 10 years of deep-tissue and assessment apprenticeship with Dr. Medici, I learned to palpate and assess subtle and specific interstices of twelve reliably sensitive places in the body. He taught that these were related to emotionally held tension. When there are unexamined beliefs held in these places, the tissue reacts in a specific and identifiable way during palpation. Eventually one may learn to identify emotionally held tension as a vibrational tone in muscles all over the body, including those inside body cavities.

Tension from scar tissue creates a thick and tightened sleeve of fascia surrounding or interpenetrating the muscle, organ, or gland that I feel as I palpate. When two surfaces that should slide over each other are stuck together, it is due to adhesions between

otherwise sliding surfaces. Does the tissue feel granular and rough, or rubbery and too smooth, like overcooked calamari? These are qualities of scar tissue when it is palpated.

When I believe scars are at cause for pain it is because I have used my own rapid deduction process during palpatory assessment. When the tissue I touch does not vibrate with unexamined emotion, or kick back in chemically induced over-resilience, I move on to another set of questions. Does the tissue feel fudgy and non-resilient—all hallmarks of biochemical tension—*and* if I do not see the postural habit in my mind's eye associated with biomechanical habits of overuse or an overall lack of flexibility, then I ask a final set of questions. If I feel the distinct rough edges of sticky, coarse, or rubbery fascia, it is only then that I begin to suspect scar tissue from physical trauma.

Planning actions. When I find tension, I dialogue with my clients about it. I ask about sensations, check their answers, and compare them to my own intuitive or palpatory senses. Based the outcome of my dialogue with a client, I make suggestions for self-care, or explain how I plan to address the nature of this particular tension.

If the client's tension is biochemical in nature, I propose a behavioral change or cleanse process that is designed to change the biochemical milieu of their ECM. These activities may include, but are not limited to giving up certain foods, drugs, drinks, or body products, and organ cleansing. If I perceive tension that is emotional, I inquire whether the client is ready to dive deeper into the sensitive or reactive spot I have located and explore anything that may come up during intensified pressure or cross-fiber friction.

If the nature of the tension is biomechanical, I ask my clients if they are willing to stretch their particular tight and/or overused myofascial loci of pain. I explain how to strengthen what is weak from underuse. If scar tissue is apparent, I will ask them to report

their sensations as I apply cross–fiber friction, while continually assessing the efficacy of this technique as the texture of the scar or adhesion changes. Frequently, I assign homework for scar tissue, including the use of castor oil packs.

Taking action. If the tension is biomechanical, I may physically stretch the client's limb or spine to soften the layers that are bound by tightened fascia. If I am working with biochemically imbalanced tissue, I will not use deep pressure, since the tissues will remain sensitive to touch until the chemistry of the ECM has changed. If I am working with emotional tension, I will go as far as the client is willing to go to encounter and integrate the emotion that is sublimated in the jumpy place we have located.

If I am working on scar tissue, especially from a surgery or injury, I will work to differentiate any normally sliding layers now adhered together. I educate each client about self-help treatments for scar tissue. I teach clients how to make and use a castor oil pack. I also teach them how to use certain massage tools for fascia mobilization and stimulation. Along with tissue cleansing, these tools have proven beneficial for systemic treatment of scar tissue after manual work in a session.

Evaluation. There is always feedback from the client's body, which may be used to evaluate the efficacy of each intervention mentioned above. Clients report the feeling of warmth, spreading outward from their affected area, when my intervention is effective. If this is not perceptible to the client, either the intervention was not effective, or the confluence of cofactors expressing as tension is too great to be addressed in a single session. There may be homework to be done before the palpable expression of spreading warmth, or *qi*, is achieved.

The sensation of *qi* moving through the body could be seen as either subjective or objective, depending on one's perspective and who poses the query. From a strictly scientific point of view, *qi* as a sensation is not measurable and its very existence as an identifiable sensation may be controversial. My belief is that all sensation is subjective, whether it is pain, as defined using a verbally reported pain-scale, or pleasure, which is rarely quantified with rigorous validity. The sensation of *qi* is quite subtle, but when perceived by the client, has proven to be a reliable prognostic indicator that resolution to the presenting pain is at hand.

I do my best to circumvent a placebo effect, which could be initiated by my request for all of my clients to investigate thier own sense of spreading warmth. I do this by masking the "right answer" in a series of choices so as not to point toward my preference for the preferred outcome of feeling *qi.* I step away from the table, so each client might feel her own body, absent from any interference from my own body heat. Then I ask that client what she is feeling in the tissue where I have been working. I have learned that when clients are eager to please the practitioner, it is necessary to offer four choices: Does the tissue feel warm, cool, heavy, or light? If the predominant sensation is one of warmth, I ask whether that warmth is static or moving. If there is no change reported, I return to my assessment model, using the Four Domains to determine the next obstacle to the movement of *qi*. This process is now largely intuitive. When using the Four Domains as an assessment tool, cycles of inquiry, planning, action, and evaluation are represented as iterations of action research for each discrete domain, and are illustrated in figure 3.3:

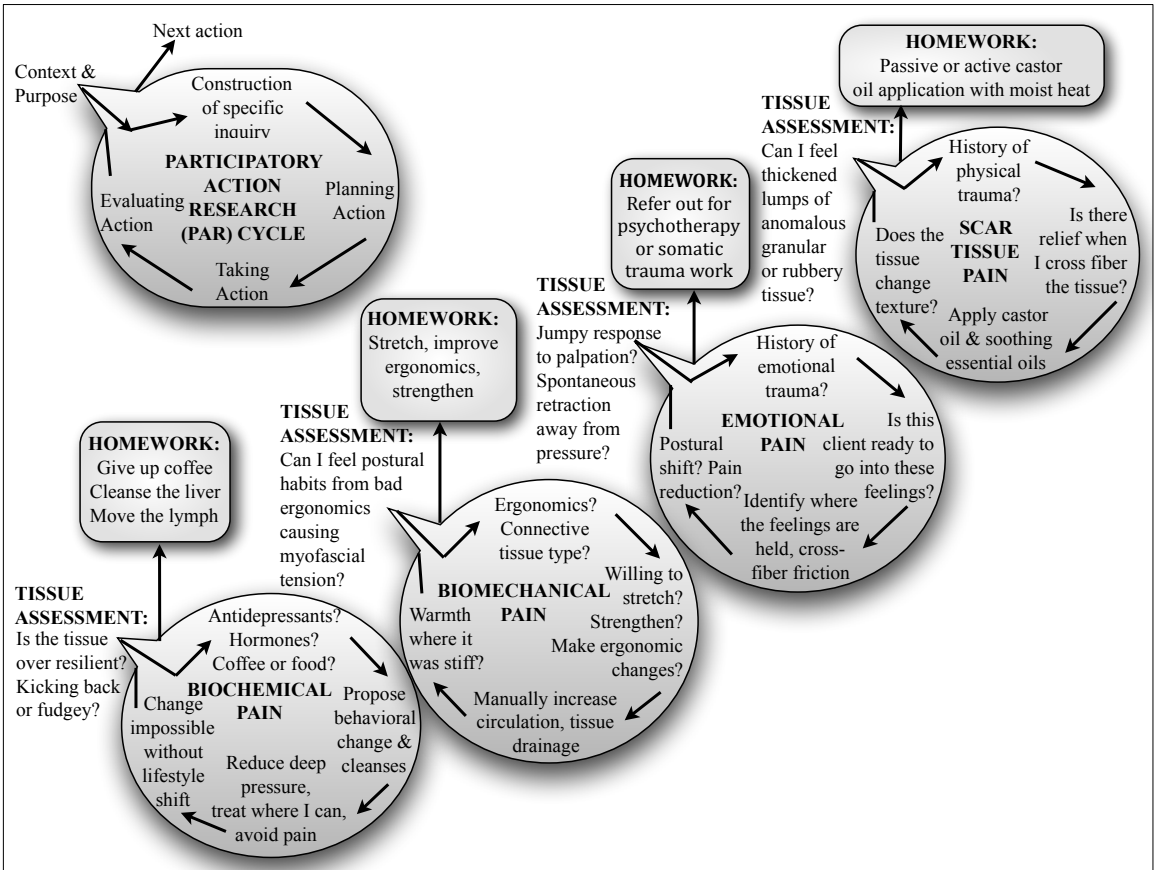


Figure 3.3. Participatory action research: Schematic of my assessment process, using the Four Domains as discrete cycles.

Context for Action Research as a Method: Kinzbach's Story

The use of somatic action research (SAR) cycles, as described above, eventuated in the development of useful, repeatable protocols in our research. To address painful sex resulting from scar tissue, use of these SAR cycles led to immediate and dramatic changes in scar tissue. This was first observed during the experience of one woman. The following is a description of her experience, including all of the elements that eventually developed into our protocols.

Kinzbach was a fellow Sexological Bodyworker who had been a teaching assistant at my own Sexological Bodywork training in 2007. She came to me for scar tissue treatment for sexual pain after the birth of her first child. She had a vaginal delivery at home, and had experienced third-degree tears to her perineum, which her

midwife stitched. Her pelvic healing was progressing in a “normal” fashion, meaning she had been cleared to resume sexual activity 6 weeks after birth. She came to me 3 months postpartum, frustrated and discouraged after finding that sex was still unacceptably painful.

At this point, I had never treated a woman for postpartum sexual pain, and was uncertain whether the techniques I used for general scar tissue remediation would work. First, I examined Kinzbachs’s biomechanics by checking her pelvic placement. Her pelvis was tilted anteriorly, and her psoas (deep hip flexor) muscles were very tight. This is a common postural adaptation to pregnancy. As the weight of the growing baby pulls the spine forward, the psoas and buttock muscles contract to help the mother maintain her balance. I worked deeply in Kinzbach’s abdomen, creating more space beneath her colon, and restored a more normal tonicity to her psoas muscles. I resolved additional biomechanical tension in her buttock muscles.

Kinzbach had excellent proprioceptive attention and accurate knowledge of her anatomy. This allowed her to place her attention exactly where I requested her to focus. Her ability to assist me by acknowledging and deliberately releasing tension from tight areas allowed her biomechanical tension to resolve quickly. She was able to use her breath as a tool to stay focused when receiving deep pressure into her abdominal area. Her psoas muscles released easily when she focused her attention and breath into this vulnerable place. We continued to utilize breath throughout her sessions, whenever challenging sensations and emotions arose.

I examined Kinzbach’s pelvic floor, surprised to discover significant swelling, local bruising, and vaginal/labial disfiguration 3 months after giving birth. She was lying

supine and her vaginal opening (introitus) looked like a smile, with labial lips stretched sideways. It was not a normal vertical opening. Her inner labia were swollen and dark purple. It was clear that blood had accumulated, causing this discoloration, and could not drain properly from these tissues. I attributed this partially to her short, tight psoas. Tightness in her buttock and psoas muscles would have constrained the normal drainage of her pelvic floor due to the collapse of healthy spaciousness in her groin, ultimately creating groin and back-buttock pressure when standing, walking, sitting, and even lying down to breastfeed.

After working with biomechanical tension in her psoas and buttocks, I massaged, pulled, and manipulated Kinzbach's labial lips. She found the contact with her genitals reassuring, although she lamented that she felt like she could no longer "teach from her table," demonstrating sexual positions and techniques for her clients, due to fears of pain. She felt disfigured after her birth and was embarrassed about the way her genitals looked.

I applied castor oil to her vulva and labia, massaging it in as I worked gradually toward her introitus. We did a mapping process of her introitus, using the cardinal points of 12, 3, 6, and 9 o'clock to determine the location and intensity of any tenderness in each of these areas. As I worked, I noticed her tissues began to look healthier in color. The change from bruised and purple to her more normal pinky-brown coloration happened quite rapidly after several minutes of massage.

The sideways stretching of Kinzbach's introitus changed as well. By the end of 20 minutes of work the tissues returned to their normal orientation. I showed the changes to her in a hand-mirror. We were both shocked how quickly her vulva tissues normalized.

This was the end of our first session. I assigned the use of castor oil packs on her vulva tissues and pelvic floor during the 4 days between sessions.

During intake at our next session, Kinzbach mentioned that the pain at her introitus had diminished substantially, but that there was still pain on penetration, located deeper in her vagina. On palpation during internal vaginal exam, I found a noticeable disruption in tissue continuity down the left vaginal floor, where she had torn and then been stitched after giving birth. I massaged castor oil into this scar, while monitoring Kinzbach's sensations. She reported a pinching sensation at certain locations, and I was able to feel lumps of distinctly denser tissue. These felt like firm rounded blueberries in size and density. I decided that it would be more helpful to use a finger to brace from underneath, from inside the anus, to provide additional support for my intravaginal finger.

Having firm support under my working intravaginal finger, which was pressing into Kinzbach's vaginal floor, enabled me to feel the size, shape, and changes in the scar tissue as I was massaging it. Suddenly a moment occurred when Kinzbach experienced vivid flashbacks of her birth experience. She described how at one point she felt helpless about her ability to literally hold herself together as the baby crowned. The baby had his umbilical cord wrapped around his neck, and there was some panic during what, up to that point, had been a serene home birth. She shed a single tear as she recalled this moment of complete helplessness and fear. As she did so, several blueberry-sized lumps of scar tissue instantaneously evaporated. They disappeared so quickly I wondered whether they had actually even been there.

I asked her if her pinchy sensation had changed, and she replied, “What pinchy sensation?” I was startled. Scar tissue that we had both been able to feel just moments before changed so quickly, it seemed she did not remember it. I was extremely curious how this profound change could occur in such a short period of time.

Up to that point, my experience working with scar tissue indicated that it took patience and persistent attention to dissolve. I had never witnessed the spontaneous, instant dissolution of scar tissue before, and we were both amazed at this dramatic rate of change. I attributed Kinzbach’s rapid resolution of scar tissue to a combination of the use of castor oil, combined with acute and accurate proprioceptive tracking. But most significantly, potent emotional release during a moment of somatic recall seemed to be the unique element that precipitated immediate and dramatic tissue change.

Kinzbach’s homework from this session was use of a castor oil soaked tampon, worn all night several nights in a row. She was superbly compliant. She reported that after three nights of oiled tampon use, she suffered from slight vaginal itching and burning. I suggested she stop the use of castor-oiled tampons immediately. She did so, and washed using vegetable oil-based soap. This was to dissolve any castor oil residue left on her vaginal mucosa. Her discomfort ceased after washing. We learned the vaginal mucosa might sensitize to castor oil and limited both duration and frequency of intravaginal castor oil exposure to avoid further sensitization.

Kinzbach was in the process of making an autobiographical film about ecstatic childbirth. She was enthusiastic about the results of our session-work together. She suggested that we film her third session. I agreed, and the third session was filmed. We did additional intravaginal and intra-anal work during this session with a camera crew in

my treatment room. Kinzbach, herself an experienced filmmaker, had produced and starred in a series of somatic sex education films. Several of these documented the techniques of Sexological Bodywork (Jaiya, Hanauer, & Jeffries, 2008).

Kinzbach was in her element on set and had no inhibitions about the work we were doing. She was able to stay quite focused on the somatic aspect of the work, tracking her sensations and emotions with her usual exquisitely accurate attention. While filming, there were moments of somatic recall, and further dissolution of scar tissue. We felt we had discovered something important about the relationship between somatic recall and spontaneous scar tissue dissolution. Her homework after this session was to attempt intercourse with her partner, and to receive intravaginal massage using castor oil as a sexual lubricant and massage medium.

Out of the enthusiasm that was generated based on the resolution of her sexual pain, Kinzbach approached me to investigate the creation of an online program for self-care and education for women who experienced similar postpartum sexual pain issues. Before embarking on this task, I suggested that we mount a critical analysis and investigation of scar tissue resolution, using an assessment model of the Four Domains and Sexological Bodywork techniques, to find out whether this combination of factors would be similarly effective for others. Here is a mind-map showing the action research cycles at work during our initial sessions as a process of discovery. The chart in figure 3.4 illustrates how action research as a methodology was at work in my initial sessions with Kinzbach even before we chose to pursue this formal investigation:

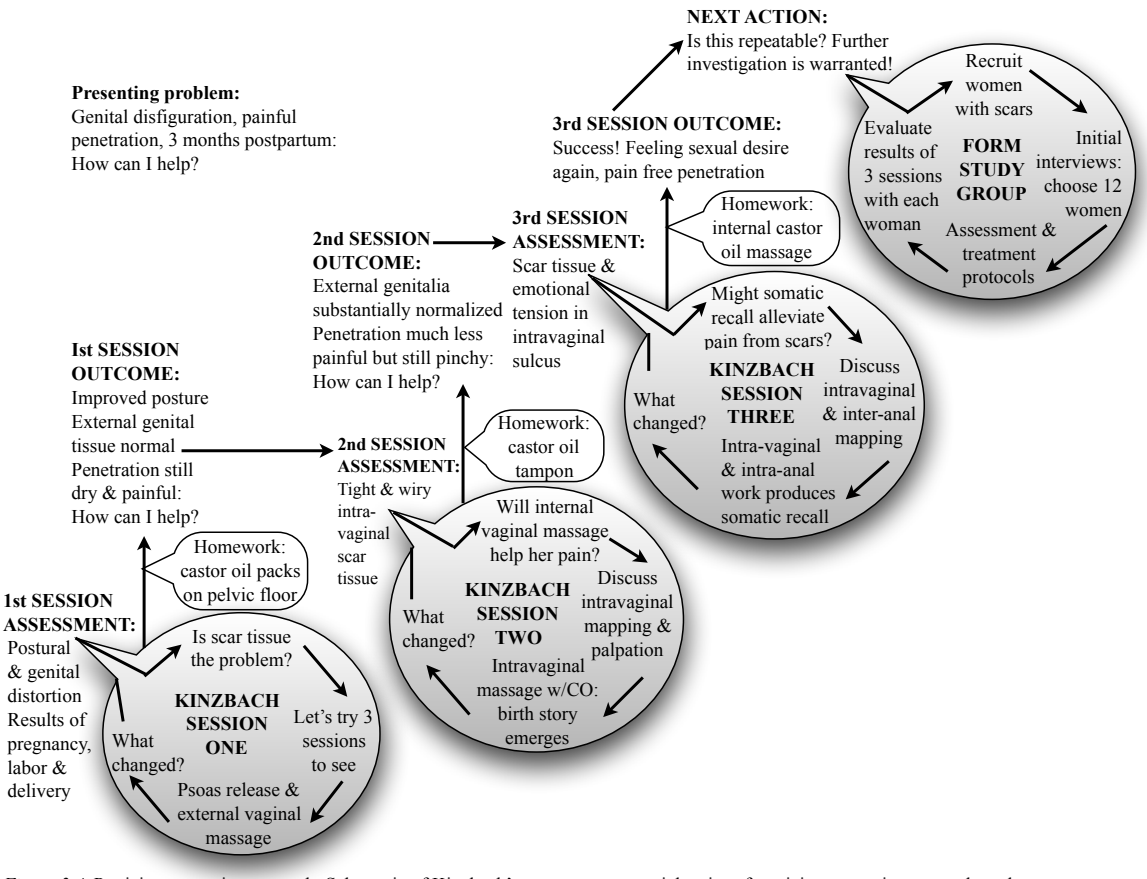


Figure 3.4. Participatory action research: Schematic of Kinzbach's story as a sequential series of participatory action research cycles.

The result of Kinzbach's three therapeutic sessions with me was the cessation of pain during sex. We were eager to find out if a collaborative process resulting in the successful treatment of painful sex was repeatable with other women. We initiated an investigation of the nascent protocols that had worked for Kinzbach, ultimately working with a group of 12 women.

We used somatic action research (SAR) at both macro and micro levels to describe and document the process by which we transformed research assumptions into working premises, and then into pragmatic protocols. Our initial intention for collaboration was to facilitate the development of a new paradigm for scar tissue remediation. We hoped that this might lead to improvements in both the world of self-

help for women with birth-related sexual pain, and professional therapeutic practices that might develop to recognize and treat women with this problem.

Research Hypothesis/Research Question

The research hypothesis and research question developed directly from my experience treating Kinzbach. Our work together led to the hypothesis that mindful palpation of scar tissue has the potential to cause immediate and dramatic tissue change. Since this had happened in Kinzbach's case after a potent episode of somatic recall, our research question was: How might sexual pain resolve as a result of somatic recall?

Our research assumptions and tools came directly out of our experiences with Sexological Bodywork. Our somatic tools and manual techniques as Sexological Bodyworkers provided sufficient expertise to address painful sex caused by scar tissue. I had applied them successfully when working with Kinzbach. Below is a detailed description of these techniques and why we thought they might work when used with a larger population of women.

In Sexological Bodywork, the techniques of manual manipulation include somatic mapping processes and massage of genital tissues. These include external genital massage, internal vaginal massage, external anal massage, and internal anal massage (Kramer, 2011). Scar tissue may have accumulated in one or more pelvic floor locations, and there are certain circumstances when simultaneous work in the anal and vaginal orifices is required to isolate, palpate, expose, and effectively remediate each area of fibrotic tissue. This is particularly true after an episiotomy or stitching after delivery to close a perineal tear.

Genital mapping may be carried out over several sessions with different emphases and is an evolutionary process. The first in a series of somatic mapping sessions might start with purely informational mapping, with the educational focus on naming the locations and functions of genital tissues (Kramer, 2011, 2017). Future sessions may focus on genital sensation (painful or pleasurable), and then on scar tissue identification, location, and therapy when sensations from scar tissue are painful.

External genital massage and mapping includes the identification and naming of the mons, labial lips, clitoral glans, shaft, and hood, the mucosal tissue lining the inner surface of the outer lips, the entire surface of the inner lips, the vestibular tissue surrounding the vaginal introitus, and the perineum. Techniques may include pulling and rolling of tissues, minute massage strokes, and palpation to locate and identify scar tissue.

Mapping of the internal vagina is accomplished by locating the cardinal points around the introitus, at the 12 o'clock, 6 o'clock, 3 o'clock, and 9 o'clock positions. As these points are palpated, a dialog with the client is engaged, with the client reporting on the relative tenderness of one point compared with another, while local tissue thickness or tenderness is observed by the practitioner. When any tender points are located, massage strokes, gentle stretching, and tissue or muscular unwinding may take place. For a description of tissue unwinding, see Chapter 4. Holding one or more fingers on a tender spot while the client recalls moments of a birth experience may initiate an unwinding process or somatic recall before cessation of pain. Unwinding is a spontaneous, beneficial change in tissue brought about by the mindful application of touch by an attentive practitioner.

Internal vaginal massage is helpful to locate and attend to scar tissue that has accumulated in the vaginal floor, that may be interfering with full engorgement of the perineal sponge, para-urethral glandular tissue, clitoris, or vestibular bulbs, located on either side of the introitus, deep to the inner labial lips. Working directly with the G-spot area, a palpable crest of engorge-able tissue located along the top of the vaginal vault is also important. It is common to accumulate a thin film of scar tissue there as a result of vaginal penetration with inadequate lubrication. When there has been vaginal tearing, one or multiple episiotomies, the perineal sponge, labial lips, vestibular bulbs, crest of tissue at the G-spot, and even the clitoral shaft, hood, or glans may be damaged. Their erectile and lubrication functions thus become limited, and painful sex will result.

External anal massage is helpful to locate and address scars that are caused by third- and fourth-degree tears. Castor oil is applied liberally to the external anal sphincter, and massaged in. Similar to working at the vaginal introitus, four cardinal points are located, and the practitioner describes where tension is more pronounced around the external sphincter muscle. While this is happening, the practitioner may request that the client breathe and take awareness into the external sphincter muscle in an attempt to release any tightness.

Internal anal massage is useful if there has been a fourth-degree tear, episiotomy, or any problems with fecal incontinence. The internal anal sphincter is innervated by the autonomic nervous system and is not under conscious control, as opposed to the external anal sphincter, which is made of striated skeletal muscle, and therefore more consciously available to somatic sensing. Nonetheless, it is possible to establish a conscious connection to unacknowledged tension held at the internal anal sphincter and accomplish

relaxation of unconscious holding patterns. When there has been deep psychological or pelvic floor injury, emotional tension is commonly held here. Prior to the working with Kinzbach, I had successfully provided relief for chronic ulcerative colitis, irritable bowel syndrome, and erectile dysfunction after working with unconsciously held tension patterns in the internal anal sphincter of several clients.

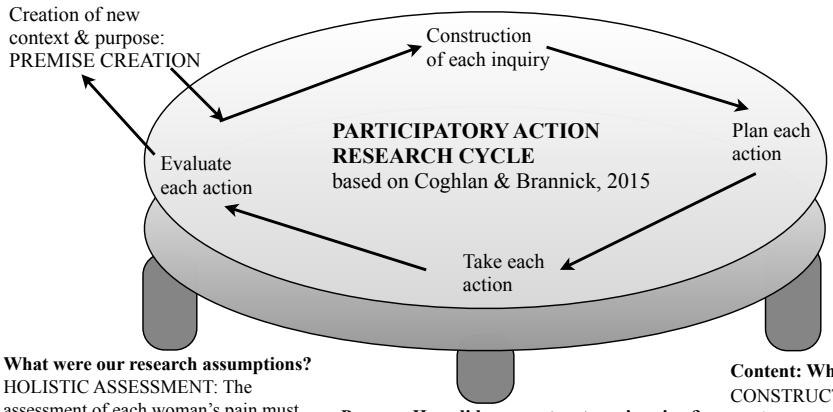
My inspiration to work directly with this uniquely available smooth muscle structure arose based on the writings of holistic midwife Ina May Gaskin, who described autonomic stress responses being held in smooth muscle as Sphincter Law (Gaskin, 2003, 2004). In her influential work as a writer and midwife, Gaskin states that the cervix is a sphincter, and sphincters need particular conditions to open and work properly. This insightful suggestion mapped precisely onto my training in shiatsu, which suggested that unacknowledged tension within the psyche is reflected by increased smooth muscle tone (Gardner-Abbate, 2001, Medici, 2012d). I welcomed the opportunity to test this assumption by working with the internal anal sphincter as a key to connecting the conscious and unconscious mind.

After assessing the tools provided by our training as Sexological Bodyworkers, we felt we needed to identify our assumptions about why and how the work to resolve Kinzbach's postpartum sexual pain was successful. The next evolution of our research process was to examine five premises that we believed had influenced Kinsbach's rapid pain resolution. The subjects of these inquiries were

- The value of holistic assessment,
- The value of somatic sex education,
- The efficacy of working with castor oil,

- The value of genital mapping and manual therapy, and
- The importance of somatic recall.

We used these assumptions to design specific inquiries, which generated five distinct action research cycles. These action research cycles are illustrated as mind maps following each of five case studies later in this chapter. With the exception of the use of castor oil, which was ubiquitous in all of our scar tissue work, each premise was explored by a particular action research inquiry, along with actions taken toward scar tissue resolution, and evaluation by researchers and subjects alike to determine efficacy. These became treatment models, which we utilized subsequently during explorations of scar tissue work with other women in our investigation.



What were our research assumptions?

HOLISTIC ASSESSMENT: The assessment of each woman's pain must be accurately positioned and identified within the Four Domains.

SOMATIC SEX EDUCATION: Pain changes when women can locate and identify sensations from scar tissue and understand how it affects sexual function.

BIOMECHANICS AND SCAR TISSUE: Genital mapping locates and identifies scars, which change from manual therapy.

EMOTION: Emotions seem to be embedded in scar tissue.
Scars change during somatic recall.

BIOCHEMISTRY:
Scars change rapidly with the use of castor oil.

Process: How did we construct our inquires?

HOLISTIC ASSESSMENT: Creation of assessment protocol using the Four Domains.

SOMATIC SEX ED: Utilize the knowledge we had to refine dialogs for anatomical & functional sex education of our participants, develop manual sensitivity to palpate scar tissue.

BIOMECHANICS: Create scripts to map external pelvic, external genital, internal genital, and anal anatomy.

EMOTION: Design a three-session sequence, Learn to notice signs of somatic recall.

BIOCHEMISTRY: Research safety, history, efficacy, and traditional methods for intravaginal and intra-anal use of castor oil.

Content: What were our actions?

CONSTRUCT SESSIONS: Design three session treatment sequence. Use assessment protocol, somatic sex education, mapping scripts, castor oil, notice episodes of somatic recall.

PLAN SESSIONS for each participant, based on holistic assessment, & outcome of previous session and homework.

EVALUATE SESSIONS: Evaluate treatment and homework outcomes, analyze results.

REFINE LEARNING: Identify common themes and outcomes based on session outcomes.

CODIFY SESSION RESULTS: Absorb and think about what works for each participant Create distinct treatment protocols.

Figure 3.5. Research assumptions, process & content development: Showing the progression of the creation of a knowledge base from premise to action. Adapted from *Doing Action Research In Your Own Organization* by D. Coghlan & T. Brannick, Sage Publications, 2014.

Research Design: Intuitive Inquiry

Intuitive inquiry is a research method composed of five "iterative cycles of interpretation" (Xenitidou & Gilbert, 2009, p. 51). It is used in transpersonal psychology, which blends mindfulness, intuitive noticing, and, in our case, respect for the fierce curiosity that we brought to the pursuit of authentic sexual and sensual embodiment. Contributions to intuitive inquiry come from feminist, heuristic, and indigenous shamanic traditions (Braud & Anderson, 1998).

The deeply physical, intuitive, and sexual nature of the inquiry we undertook with our research participants made intuitive inquiry a natural choice as a part of our research methodology. We believed that women's experience of childbirth, sex, and pain are individually subjective and not easily quantified. While action research was a good method for examining our clinical work as Sexological Bodyworkers, we used intuitive inquiry to more deeply integrate the model of the Four Domains as an assessment tool.

In addition to action research, we needed an additional method that allowed us to test and deploy the Four Domains for intuitive accuracy. It was our goal to successfully differentiate lifestyle contributions to sexual pain from birth-related scar tissue. We needed a research method that allowed us the flexibility to determine whether our treatment approach would be appropriate for the variety of symptoms presented by our research subjects. When we encountered individual variations in symptomology, we used the model of the Four Domains to analyze the origin of each subject's pain, so we could parse birth-related scar tissue from other potentially confounding factors.

Rosemarie Anderson developed intuitive inquiry as a transpersonal research approach in the mid-1990s. The purpose of this method was to "invite intuition into the

research process" (Xenitidou & Gilbert, 2009, p. 51). Qualitative research methods have been evaluated and critiqued extensively in academic literature. I was looking for research methodologies that allowed me to employ my own perception as a measure of validity, as my training has taught me to do.

Among postmodern research methods, what drew me to the combination of action research and intuitive inquiry was the possibility for the inclusion of my own felt experience as an acceptable measure of truth. I felt these were methodologies that could respect somatic validity, as it is *felt and known* in my own body, and as such, intrinsic to my research process. The writings of Rosemarie Anderson satisfied this crucial requirement of my methodology search, by mapping accurately onto my personal experience as a bodyworker, somatic educator, and healthcare provider:

> Continuing to write in a Cartesian style seems no longer acceptable, especially in the fields of transpersonal psychology, consciousness studies, health psychology, and positive psychology. Disembodied writing just perpetuates the object-subject bifurcation between the world of our bodies and the world we inhabit. In the nineteenth and twentieth centuries, the hegemony of behaviorism in psychology widened the divide. The legacy of Western philosophy and psychology notwithstanding, we are viscerally and perceptually part and parcel of the world in which we live, attuned to its vicissitudes and nuances, and informed moment to moment and over the seasons of our lives by its sensuous enactments. (Anderson, 2001, pp. 1–2)

When surgery or injury necessitates the wound healing process, the ongoing propagation of scar tissue results from a confluence of unfortunate relationships between

and among the Four Domains. Understanding the mechanics of these relationships includes the examination of the biomechanics of physical posture and its analysis, the identification of emotional and psychological aspects of injury and pain, and an accurate assessment of biochemical contributions to that pain. How to integrate this understanding into our research systematically was another reason to choose intuitive inquiry as a method.

Intuitive inquiry (II) was the larger frame used to design and implement this critical investigation. Like action research, intuitive inquiry is an iterative process. There are five distinct iterations of the interpretive process in intuitive inquiry. The first iteration requires the selection of a text or an image that deeply grasps the attention and curiosity of the researcher (Fischer, 2006; Xenitidou & Gilbert, 2009). The interpretation of the meaning of the image is approached from both objective and subjective perspectives by the researcher (Fischer, 2006).

The second iteration is one of reflection on the image or text after its identification, where it may be meditated upon, drawn, dreamed, or otherwise creatively visualized (Anderson, 2004; Fischer, 2006; Xenitidou & Gilbert, 2009). The third iteration is a tripartite process, in which data sources are chosen, criteria for research selected, and data collection occurs (Anderson, 2004; Fischer, 2006; Xenitidou & Gilbert, 2009).

In the fourth iteration of intuitive inquiry, the collected data is interpreted. In order to express a deeper understanding and contextualization of the research process, the fourth iteration is defined as a "refinement of the lenses" that were identified, internalized, and utilized in the previous three iterations (Fischer, 2006, p. 301). This is

an ongoing examination of one's subjective and objective relationships to the data as it is interpreted, partly as an internal dialectic, and partly as an external process of rigorous interrogation of the validity of what has been discovered (Anderson, 2000; Fischer, 2006). "When they are cross-verified in both the mechanics of conventional objective science and in the more unconventional intuitive sense of the researcher, both objective and subjective knowing can contribute jointly to our understanding" (Anderson, 2000, abstract).

In the fifth iteration, reflection on the entire process completes a hermeneutic spiral. This research project may be seen as a nested series of spiraling hermeneutic cycles leading to a broad, holistic, and contextualized understanding of what was learned as a whole. During each iteration of intuitive inquiry, we as researchers had the opportunity first to observe, and then to integrate our own subjective and objective relationships to the original query. This process applied to data collection, analysis, and interpretation (Braud & Anderson, 1998; Wertz et al., 2011). Rosemarie Anderson describes the completion of the research as process as "recognizing without blame the difficulties and incompletions, making appropriate amends as necessary, expressing gratitude for the gifts of insight and delight, and celebrating the acts of generosity that allowed new understanding to unfold" (Braud & Anderson, 1998, p. 94).

The processes of the first two iterations of intuitive inquiry involve working with the unconscious by finding a symbol that captures the imagination of the researcher. A process of deep identification with the symbol is one that represents meaningful and compelling engagement at the soul level (Anderson, 2001, 2004). Intuitive inquiry has been described as "an epistemology of the heart that joins intuition to intellectual

precision in a hermeneutical process of interpretation" (Blake, 2012, para 1). Hermeneutical interpretation may be understood as "a spiraling ontological structure of understanding" (Warren, 2014, para 5).

Image Selection

The first iteration of intuitive inquiry is image selection**.** In this chapter, I have used a graphic process of mind mapping to visually represent the outward-spiraling relationship between action research and intuitive inquiry iterations. These mind maps are inserted throughout this chapter to illustrate my research efforts. The image and text that I used during the first iteration of the intuitive inquiry process depicts the Four Domains as a pie chart divided into four quadrants (see figure 3.6). Each quadrant is depicted as a single aspect of the Four Domains:

- Biochemistry/Nutrition,
- Biomechanics/Posture,
- Scar tissue/Disruption of cellular processes.
- Emotion/Somatic recall

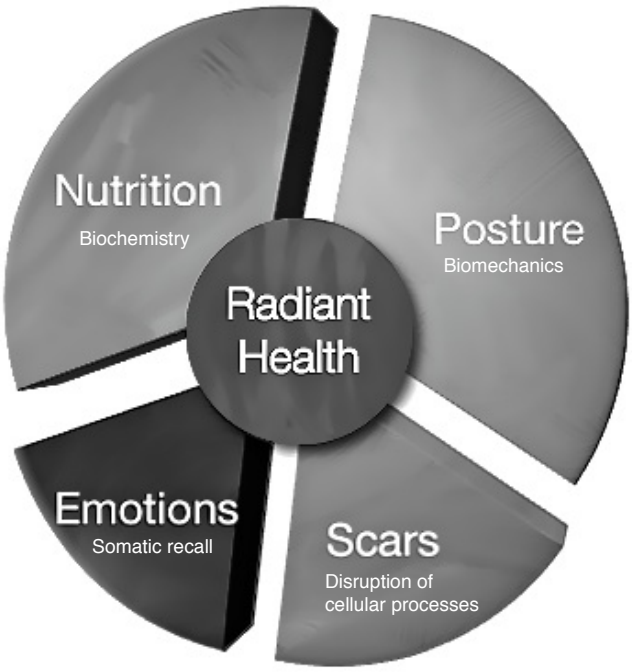


Figure 3.6. Intuitive inquiry: The Four Domains of health (Heed, 2010)
Used as a tool for visualization and contemplation during the second iteration of the intuitive inquiry process.

Visualization

Visualization of the selected image is the second iteration of intuitive inquiry. Intuitive inquiry spoke to my natural inclination to use visualization as an integral part of my learning process in every aspect of my work. My training in Visionary Craniosacral Work (VCSW) taught me to value the use of active visualization as a way to get at truths that might otherwise be elusive. Despite my comfort with the accuracy of action research as a process to facilitate healing using the deductive process of the Four Domains, sometimes a wider intuitive leap is required to understand the true origin of certain kinds of pain. Nonetheless, during assessment and treatment, the Four Domains act as lenses through which this visionary process may be parsed. Creative tension between intuitive and deductive approaches includes an active inquiry into the simultenaety of relationships between all potential contributions to pain.

To facilitate this understanding when working with clients, I developed an intake form divided into four quadrants. Each time I do an intake in clinical practice, I inquire both directly and intuitively about each of the Four Domains. In order to assess and address what comes up during each session, I hold the pie chart illustration in my imagination while I am working. By using this holistic intake system, each session generates a map of the Four Domains and their influence on my client at time of session. When using this array of four lenses, I am more likely to properly identify and unravel any subtle, overlooked, apparently unrelated, or forgotten causes of pain. Only when the right questions are asked, can the answers reveal specific information necessary to provide each individual with pragmatic self-help practices for improving health and the relief of pain.

Use of the Four Domains as lenses of intuitive inquiry requires that the practitioner embody multiple sensory modes, including not only the use of the five normal senses, but also the use of her inner eyes, inner ears, and tiny, intracellular imaginal hands. The use of these as internal and externally generated cues explores each domain, leading ultimately to an embodied knowing in the practitioner about each domain's roles as either obstacle or facilitator of the expression of health for each client. This is accomplished by first understanding, and then mentally scrolling through the parameters of each domain and is a mix of intuitive and deductive processes.

Once mastered and applied with speed and accuracy, the process appears to be purely intuitive. Yet, this Four Domains visualization/inquiry is a hybrid sub-program of deductive logic and intuitive inquiry that is always running in the background—the practitioner's private, rapid-fire internal use of contrast, comparison, and association.

During this internal dialogue, the questions posed about the beneficial or pathological expressions of blood chemistry produce different information than questions about the emotional past, postural patterns, or client's history of physical injuries. The advantage of this process is its thoroughness. The disadvantage of the process is that it takes a long time and a lot of experience to master. It also requires faith in one's intuition, which may take even longer to develop.

The process is one of continually toggling associatively between what is sensed externally and what is known internally, based on previous experiences. Using information gathered from the use of my external eyes and inner eyes, I ask myself, "what can I see without looking?" The use of my external and inner ears may divulge what my client has inadvertently said, while not saying it directly. What do I notice when paying attention to the veracity of my physical hands, and what can I feel with my imaginal hands, assessing for palpatory clues at the molecular level of the client's extracellular matrix? During this process I dialogue with my clients, checking back to test my accuracy about thier own felt sense compared with what I perceive. This is covert awareness in action and takes time to learn and to trust.

Among various assessment or diagnostic processes, the model of the Four Domains uniquely acknowledges scar tissue as an essential cause of pain. The intuitive use of four lenses, through which we assessed the effects of each domain, were imminently useful as a part of the visualization process. Accurate and thorough assessment produced successful results, addressing a variety of secondary causes of pain outside of the scars themselves. Because I marinate in this intuitive perspective daily in my professional life, it was natural that I apply it when Kinzbach came to me for help

when she experienced painful sex after childbirth. It was also natural that we use the Four Domains as an organizational model for the intake and assessment of the twelve women who joined our investigation.

Subjects

There are three steps in the third iteration of II: Locating appropriate data sources, choosing research criteria, then collecting the data. The best data source were women who, like Kinzbach, had birth-related injuries and experienced sexual pain after childbirth. I had been an anatomy teacher and workshop leader in the Los Angeles yoga and bodywork community for 10 years prior to this investigation, and asked fellow yoga teachers, massage instructors, holistic practitioners, and my own clients if they knew anyone who complained of sexual pain resulting from childbirth. Kinzbach did the same within her circle of clients, students, and colleagues.

We posted an announcement about this research on Facebook, and interviewed each respondent carefully, to determine if she was a good candidate. We had an immediate and enthusiastic response. We offered our services as investigative scar tissue remediators for free, and as we both had substantial followings, we filled our research schedule easily. Email and social media announcements can be found in Appendix C.

During this critical investigation, we worked with a convenience sample of 12 women over the course of 6 months. Most of the women who participated in this study lived in or near Los Angeles. Eight of the 12 were residents of LA County; 1 came from Orange County, and 1 from San Diego. One woman was newly arrived in Los Angeles from Poland, and another woman was also originally from Poland. Each of the women in our study gave birth either one or two times, with no reported stillbirths. For 7 of the 12

women, this was their first birth. The remaining 5 women had two children; all subjects' children were alive and healthy. The ages of these children ranged from 1 month to 21 years.

Secondary in the third iteration of intuitive inquiry is the development of criteria for research and its participants. Our criteria for subject participation were very specific. We needed a group of women who had the level of somatic awareness that would inform us about what was working (or not working) in our protocols, so we started outreach from our contacts within the yoga and bodywork communities.

When Kinzbach came to me for scar tissue remediation, she had training and experience as a tantra practitioner. Years of tantra practice, meditation, and yoga, as well as her own native talent, afforded Kinzbach extreme proprioceptive awareness. She also had years of experience as a Sexological Bodyworker and taught her clients sexual arousal techniques and practices. She demonstrated these techniques through the use of her own body as an example of erotic possibility. We thought it unlikely that we would find many women from similarly intensive somatic sex education backgrounds as subjects for our investigation.

Nonetheless, it was important to find research participants who had as much somatic awareness as possible. Only then would we find ourselves in the best position to learn about the efficacy of our protocols and get accurate feedback about whether our developing somatic sexology approach was useful for scar tissue remediation. One of my personal criteria for subject inclusion was to find and select women who had an ability to sense the movement of *qi,* or "felt energy," in their bodies. Selecting women who had this

ability was a process I was trained to pursue during my tenure as an anatomy and physiology teacher at Shiatsu Massage School of California (SMSC).

Most women have not been exposed to a functional somatic definition of *qi,* much less know how to describe whether it moves through their body. However, feeling *qi* was a common experience among my students and colleagues at SMSC. Shiatsu School students were well versed in perceiving the movement of *qi,* including how to know whether it was authentically spontaneous or manufactured, and what kinds of obstacles prevented the perception of its movement. The concept of the Four Domains was central to the Shiatsu School curriculum, as a main tenet for assessment, health analysis, and choice of treatment utilized at their intern clinic. Assessment using the Four Domains, as well as "feeling *qi*" were part of the school's common somatic language. Word went out about our investigation among the students at the school, and several of our research participants came through this channel.

After the interview and subject selection process, we proceeded to the third part of the third iteration of intuitive inquiry, data collection, by setting up appointments with the women we had selected. For our intake and treatment process, we worked in my private clinic located in Los Angeles. This was a 500-square-foot remodeled garage, with well-insulated bamboo floors, insulated walls and ceiling, which also boasted a powerful heater. There was a couch with side tables, a reclining chair with footstool, and my massage table. This room provided a comfortable place for both subjects and researchers to sit. During the intake and assessment process Kinzbach and I took turns; one of us took notes while the other worked directly with research participants on the massage table.

An in-depth intake process was created. Our interpretation of each woman's intake information was based on her objective history of sexual pain, and our intuitive analysis of each of the Four Domains in relation to her particular scar-related pain presentation. We used this information to deliver genital mapping as somatic sex education, palpation and manipulation of scar tissue, use of castor oil during research sessions, and suggestions for home-based self-care.

The data we collected included each woman's childbirth story, surgical and other medical history, reproductive organ and pelvic floor function, bowel function, menstrual problems, hormonal problems, history of sexual abuse, and exercise and nutritional profiles. We ascertained each woman's hopes and goals for the work we were to do together, and what she wanted to change in her sex life.

I assessed the relative density of each woman's connective tissue, knowing that it was a prognostic indicator of what kind of density of scar tissue to expect, and the likelihood of other complications from childbirth, such as perineal tearing (more likely to cause problems in women with denser connective tissue) or prolapse (more likely to be present in women with looser connective tissue). I had learned this method of visual and manual discernment during the years I spent observing the practice of thousands of yoga teacher trainees during my anatomy workshops, and also while participating alongside Dr. Medici in the manual assessment of hundreds of students at Shiatsu School seminars.

Aside from assessment of connective tissue density, Kinzbach and I were well matched in observational as well as manual skills. While our training differed, we had equal abilities as assessors. When working on the massage table, the one who was acting as practitioner that day would stand next to the subject or sit near the table. Both

Kinzbach and I could manually assess craniosacral rhythms, myofascial patterns of tension, and external scar tissue. While doing pelvic floor exams or internal work, the one acting as the practitioner would sit on the table with each subject. The subject would lie supine, and we would be seated between her legs, our own legs straddling the table, with our subject's legs laying over ours. We found this position gave us the best access to palpate and manipulate scar tissue on and inside her pelvic floor.

We collected data via the intake process from forms designed to analyze the influence of each of the Four Domains. We took notes during session work. While one of us worked hands-on with the subject, the other acted as scribe. We traded places over the course of three sessions, so each of us did each job with each subject. Figure 3.7 is a chart of the approximate session sequence for each research subject.

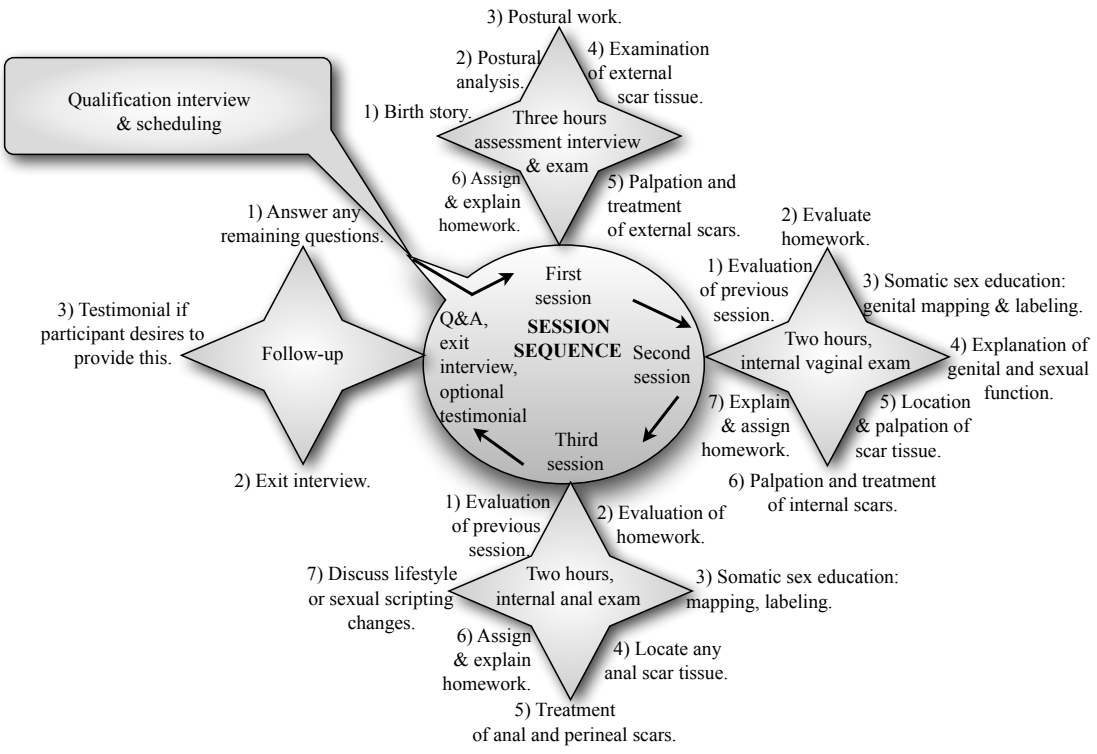


Figure 3.7. Research session sequence, illustrating development of the PAR cycle into a three-session treatment protocol. All of the elements we determined to be valuable as session content are constellated around each session's four-pointed star.

Instrumentation and Data Collection

During our rigorous intake and interview process, we created a series of forms to document each subject's birth story, sexual history and goals, and postpartum pelvic function. We noted physiologic changes in subjects' organs of reproduction, elimination, and digestion. We also noted changes in her physical ability and exercise regimen. In addition to the intake forms just mentioned, we used six additional forms that I had previously designed for teaching general assessment and intake skills. These forms were a more detailed version of the intake form I typically use in private practice. These forms can be found in Appendix D.

Depending on the subject, we used 19 or 11 forms to structure our intake interviews, which lasted from 2 to 2½ hours. By the end of the intake, we had sufficient information to begin a physical exam, focused on locating and evaluating each subject's scar tissue and any functional sequelae in her pelvis and pelvic floor. We took extensive and detailed notes during intake interviews.

We used a more loosely structured format to document what happened during table work for each session. The table work forms we used had just three fields: Findings, Treatment, and What Changed (if anything). Since this work was new to us, we felt it necessary to use an open-ended format to make our inquiries and notes. While one of us worked hands-on with each subject, the other took detailed notes. We made a separate set of notes for each session. Kinzbach and I took time for a session review at the end of each subject's session.

After Kinzbach and I evaluated each session, we used the information culled from that evaluation to design that subject's next intake. During this process, we also took

notes and gathered data about results of self-help homework: how the subject reacted to castor oil application, self-massage, or any other homework assignments. We discovered what was effective, and what was less so.

We welcomed subjects' feedback, documenting their homework reports. Thematic material emerged during hands-on, hands-in work, and we noticed and tracked these themes. After the research period ended, I made a concentrated summary of each of 5 subject's experiences, and used these summaries to write five case histories, presented below. The summaries can be found in Appendix E.

We interpreted our data by analyzing it as iteration cycles of action research, noted in the mind maps illustrated above. The Session Sequence mind map shows approximately what we did in each session, and in what sequence. Since the women in our investigation had differing pain presentations, different themes emerged during their sessions, and there were variations in what we did with each woman. Each subject's session was individual, and there was some variation from this format. Not all subjects required internal anal exam, for example. We used intuitive inquiry to identify confounding factors outside of scar tissue that might have contributed to each subject's sexual pain.

We used session intake forms and notes as a basis for collating, analyzing, and presenting this information. Five representative case histories are documented in detail below. Consent forms are available in Appendix F.

I used a process of mind-mapping to illustrate the development of thematic material that eventually become part of the protocols we used during examination and treatment for the remaining women in our investigation. These mind maps can be found

at the end of each case history recounted below. When thematic material emerged that provided additional insight or caused us to re-examine our research assumptions, it was best summarized in the information-dense format allowed by the mind mapping process. Each mind map follows the research session where the particular thematic material first emerged.

Data Analysis: Five Case Histories with Emergent Themes

Somatic Recall: Kimberly's Story

I met Kimberly at a retreat center in Thailand in June of 2009, where she was co-teaching a yoga teacher training. I was teaching the anatomy portion of the training. My first impression of Kimberly was that she looked like a deer caught in oncoming headlights. She looked pale and exhausted, and her eyes had a slightly glassy stare. She had a haggard look about her, and my sense was that she was carrying some kind of shock in her nervous system. She was in her mid-thirties and had a 2-year old daughter who was traveling with her. I took in her story while we were eating dinner together one night near Chiang Mai.

After years of traveling the globe as a mendicant yoga teacher, Kimberly moved to Brazil. In Rio de Janeiro, she practiced as a Rolfer and yoga teacher. She met and was romanced by a Brazilian man, and the outcome of their relationship was her daughter. She and her daughter's father did not remain together, and Kimberly continued to live in Brazil to pursue her professional passions. She told me about her harrowing birth experience. She cared for her baby entirely by herself, in a foreign land, learning to speak a foreign language, with little support. She mentioned she had some physical problems resulting from giving birth but did not elaborate.

Seven months later, Kimberly was in Southern California visiting family, and heard about my work with Kinzbach. She came to see me as a pilot research participant. I saw her alone as her appointments were set up on very short notice and Kinzbach was unavailable to participate in these sessions.

First session. During our intake interview, Kimberly emphasized that she was passionate about rights of women to have access to their birth of choice. She had trained as doula since our meeting in Thailand, motivated by her own birth experience and the desire to advocate for birth choice. She was eager to share the model of un-medicated home birth in her new role as a birth educator in Brazil, a country with one of the highest C-section rates in the world. It was not surprising that she felt betrayed when her carefully planned home birth in Brazil did not yield the sense of comfort and bonding she expected. Instead, she emerged from her birth experience injured, weakened, and isolated.

She gave birth in a standing position. It was my impression that her somewhat delicate low-density connective tissue was especially prone to over-stretching, tearing and tissue damage. This was a biomechanical influence within the Four Domains. This information provided important insight about how her body responded to stress, in this case the stress of childbirth. Kimberly told me she felt betrayed by male yoga teachers in the Ashtanga lineage. This school of yoga places intensive concentration on activating pelvic floor muscles. Kimberly was angry and disappointed that she got no information about how overworking these muscles could cause of birth injuries for female yoga practitioners.

She felt misled and abandoned by her midwife who had left her alone during the birth itself and failed to provide her adequate information about a severe pelvic floor tear and whether it was healing properly. She said she was not informed about the consequences of birthing in a standing position, which increased the likelihood of perineal tears. She had experienced difficulty breastfeeding resulting from pelvic floor pain, and also had trouble walking due to destabilization in her pelvic ligaments. Additionally, her midwife had not provided sufficient follow-up in the months following her birth, failing to notice that Kimberly developed an infection in her severely torn pelvic floor.

Analyzing Kimberly's presentation through the lenses of the Four Domains, her infection was significant as a biochemical element in the development of scar tissue. I saw the infection as a contributor to an inflammatory process that went untreated and propagated the development of active scar tissue. Kimberly stated she suffered significant pelvic floor tears that affected her posterior vaginal wall, perineum, and both anterior and posterior anal walls. She reported fecal incontinence for the first 11 months after birth, with occasional fecal leakage 2 years later. Postpartum fecal incontinence, in addition to her unchecked infection, added to potential further inflammation and scar tissue propagation.

Kimberly had not regained her pelvic stability or core strength after birth, with the consequence of an inability to lift anything heavy, including her rapidly growing 2-year-old. Observing her through the Four Domains lenses of biomechanics and emotion, her pelvic and core instability resulted in debilitating consequences. Kimberly felt weak, and

powerless to make gains in abdominal tone. Yoga exercises she attempted postpartum made her feel worse instead of better.

Her body, which was her main resource and tool for work, as both yoga teacher and bodyworker, was not functioning reliably. She was shocked and disappointed that this was the outcome of her childbirth experience. Her faith in her yoga and bodywork training was shaken. She had believed that her many years as an advanced yoga practitioner and Structural Integrator should have provided adequate preparation for birth and all of its consequences.

Sex was still painful for Kimberly, even 2 years after the birth of her daughter. Her goal for our work together was to alleviate painful intercourse and regain connection to her core strength and stability. When I examined her, she had diastasis rectus (separation of the rectus abdominis muscles from the midline) that was several fingers wide and was unable to feel enough sensation to contract her lower abdominal muscles at all.

My training in craniosacral therapy and study of meridian theory at SMSC suggested that the lack of sensation in Kimberly's pelvic floor might be a result of nerve compression in her sub-occipital space. As I palpated her neck and shoulders, I noticed they were holding quite a bit of tension. The base of her skull felt glued to her first cervical vertebra. I suspected both vagus and hypoglossal nerves compression due to her tight neck and upper back; perhaps as compensation for her lack of core strength. I wondered if the tension in her lower skull and neck might be a contributing factor in the lack of pelvic floor tone she reported. In addition to the biomechanical stresses of lack of core and pelvic floor stability, I attributed her tension to the emotional stress of being a

single parent, and the dogged determination she demonstrated by continuing to take care of her daughter alone, while working as a Rolfer, somatic educator, and birth activist in a foreign country.

I used deep myofascial work and several craniosacral techniques, softening her neck and shoulders to encourage systemic relaxation of entire her nervous system. My intuition was that, with the kind of posterior cervical tension she demonstrated, improvements in neurological information could not get through to any place in her body. She down-regulated as a result of the decompression of the base of her skull, as I gently lifted it away from the top of her spine.

As she relaxed, I sensed Kimberly starting to come back into her body. She reported feelings of warmth spreading down her spine and into her arms. She lost some of the glassy stare that I had initially noticed 4 months earlier in Thailand. As she became more present, she shared an adroit sense of humor, which had been notably lacking in this and our previous encounters.

Since her return to Brazil was imminent, I wanted to obtain as much information as possible during her first session, in order to plan a short course of treatment that would be helpful. I did an intra-vaginal exam, and I noticed her left obturator internus muscle was extremely tight. All of her deep pelvic floor muscles were tight, while the overall tone of these muscles was weak. When asked to contract her vaginal muscles around my two fingers, there was little contraction available at her introitus. I noted quite a bit of visible scar tissue on her perineum, which I massaged with castor oil from both an internal and external approach.

Second session. During the intake process for Kimberly's second session, she described more about the painful infection in her pelvic floor, which went untreated in the hectic and exhausting months following childbirth. I re-tested the strength of her PFMs (pelvic floor muscles), and found they were still quite weak. I manually examined her vaginal vault internally, palpating above and behind her pubic bone. There was a lot of thick, ropey scar tissue near her midline (linea alba). This midline connective tissue was two finger widths away from her rectus abdominis muscle on each side, and I was curious to see if I could feel the empty space between where rectus abdominis had separated from her midline from this internal approach.

During intravaginal palpation, we talked about boundary making and betrayal. I questioned her about her relationship with her midwife. I intuited a relationship between her sense of betrayal by her midwife and the physical lack of integrity between her abdominal muscles and her midline, representing Kimberly's ability to hold on to herself. Kimberly confirmed her midwife had not informed her about any potential consequences of giving birth in a standing position. She also told me about a date rape when she was 18 years old, and how she felt she had to handle it alone. I asked her if that sense of having to take care of everything on her own was a theme at her birth, and its aftermath. While we were discussing this, much to my surprise, Kimberly's midline began to wriggle spontaneously; to unwind. It felt to my fingers as if it were twisting—like the agitator inside a washing machine—spiraling first in one direction, then the other.

I had never had my fingers on the posterior aspect of anyone's linea alba midline connective tissue before, and certainly never suspected the linea alba was capable of spontaneously unwinding! I began to wonder if connective tissue indeed had the

sentience ascribed to it by certain yoga, osteopathic, and craniosacral practitioners (Avison, 2015; Milne, 1995a; Minasny, 2009; Post & Cavaliere, 2003; Tozzi, 2012; Walker, 2014). I followed Kimberly's midline as it unwound, her spontaneously moving tissues responding to my light finger pressure, while verbally describing what I noticed. Kimberly confirmed that she was aware of feeling motion-—something faintly squirming just above the middle of her pubic bone.

I applied castor oil and cross-fiber friction to the thickened, ropey scars I felt surrounding the attachments of Kimberly's linea alba. At the end of this work, Kimberly was able to feel increased sensation from navel to pubic bone. She could once again feel and mildly contract her lower belly in isolation, which had been completely out of reach since the birth of her daughter. This represented a second instance of somatic recall with an unexpected outcome since working with Kinzbach, and another instance I could not explain within the constraints any of my previous training.

Third session. At Kimberly's third session, she was excited to report that her diastasis rectus spontaneously closed. She now had integrity and a return to functional strength in her midline and abdominal muscles and was feeling more stable and capable of lifting things (like her daughter) with sufficient core strength and support. I asked her to do a half sit-up so I could feel her abdominal muscles contract and palpate the width of the split down her midline. The split between linea alba and rectus abdominis, palpable just a few days before, was gone. We were both amazed, as neither of us had ever heard of such a thing. It was our assumption that once the abdominal muscles split from the midline, there were limitations to the ability of these muscles to come back to the level of functional integrity Kimberly demonstrated.

We progressed to posterior pelvic floor work and an intra-anal examination. I found a lot of scar tissue in her rectum, and also found her tailbone significantly displaced left. She was hypertonic in her left coccygeus (tailbone muscle), and I could feel adhesions between her pelvic floor muscles. With the fingers of my other hand, I could feel the gash where her infected vaginal tear had left a deep scar. This scar seemed to be connected to the adhesions I was feeling with my intra-anal finger. I applied castor oil and gentle cross-fiber friction at her tailbone, and applied castor oil intra-vaginally to the thickened adhesions I felt between these two body cavities. As I massaged and stretched the scar in her rectum, I was able to feel some release in her weak, still hypertonic pelvic floor.

While I was working, we talked about pelvic floor dysfunction and Kimberly's experience of fecal incontinence. She described the lack of proprioception in her anal sphincter, and the difficulty she had sensing whether she was leaking or not. We talked about the feelings of depression, isolation, and confusion in the months after her birth experience. I wondered if her lack of sensation might have been related to feeling disconnected from her roots in the US, her family, and especially to her mother, with whom she was close. She replied this seemed accurate. By the end of this session, Kimberly was able deliberately contract both vaginal and anal sphincter muscles readily and with more strength. Any remaining problems she suffered from fecal incontinence resolved, as she happily reported to me during a Skype call after returning to Brazil.

Kimberly's success was attributable to several things. She was extremely sensitive, which I attribute partially to low connective tissue density. I notice faster response times and more intense sensations in those who have looser, less dense

connective tissue. My training at SMSC taught that in these individuals, there is less physical impedance to neural transmission. Kimberly was also quite proprioceptively aware due to advanced training in yoga and bodywork. She knew her pelvic floor anatomy well and was able to give accurate and specific feedback as we worked together.

I was beginning to suspect that episodes of conscious somatic recall, combined with placement of somatic attention, lead to unexpected, unpredictable, and sometimes inexplicably positive outcomes. The relationship between unexpected physical changes and episodes of somatic recall became identified as a primary inquiry for future investigation. I believed that somatic recall, as charted in figure 3.8, was an important element for the complete resolution of scar tissue and its sequelae due to a traumatic birth. This was a premise that we tested repeatedly as we progressed with our project.

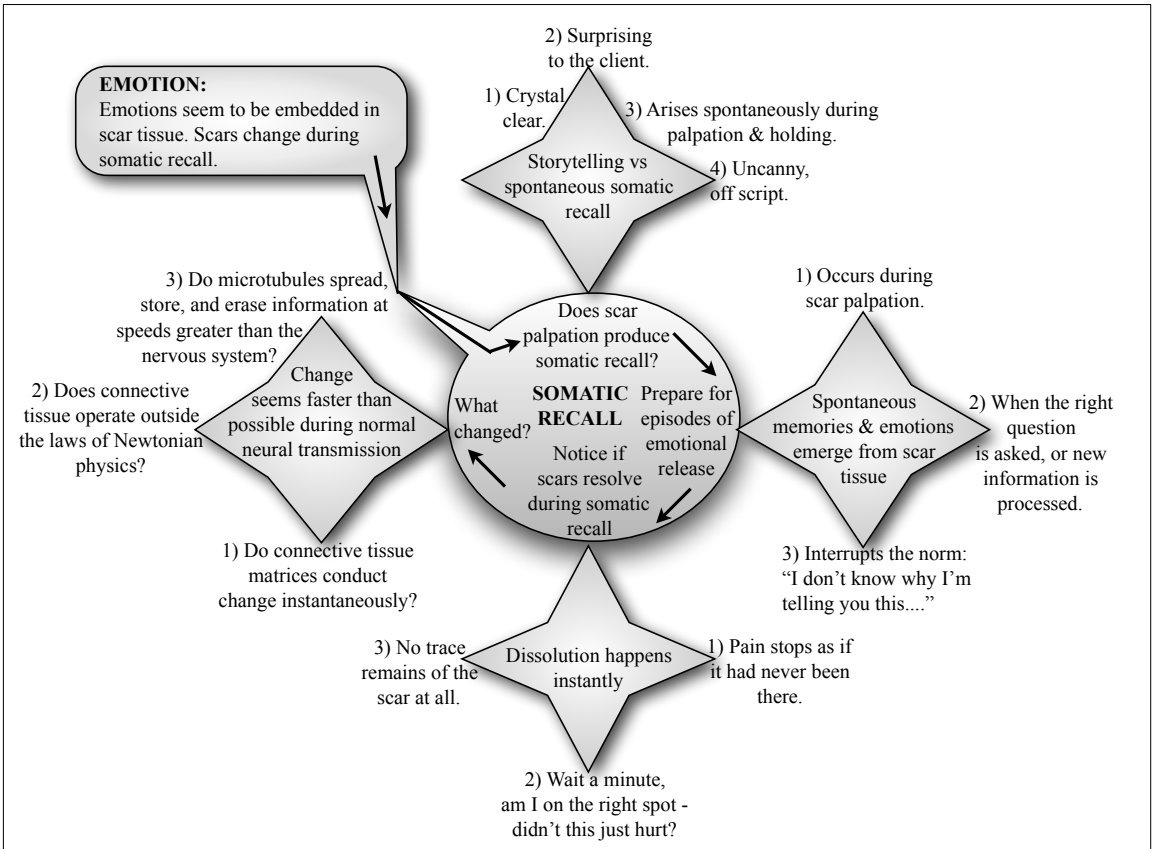


Figure 3.8. Participatory action research cycle expanded to show the development of our hypothesis that somatic recall is linked to the dramatic resolution of scar tissue. Our questions about how/why this might occur are constellated around the left-most four pointed star.

Mapping and Manual Therapy: Rowena's Story

Rowena was the wife of a film director who frequently collaborated with Kinzbach. He operated the camera during Kinzbach's third session with me, and closely witnessed her scar tissue remediation on the massage table. He was eager to see if we might help his wife Rowena, who suffered from painful penetration since her cesarean birth of twins.

Rowena was in her late thirties and worked as a pre-and postpartum physical trainer prior to pregnancy. She looked like she was in great shape physically when she arrived for her first session. However, during her intake she revealed she felt a lot of pain and very stiff, "like she was 90 years old." She had pain in her sacroiliac joints, low back,

and right hip. She delivered twins via C-section 3 years before, and sex had been increasingly painful since then, particularly during the past year. She reported sex hurt her cervix; it felt battered by penetration. The sensation of contact with her cervix was one of cramping, of both cervix and uterus. Her sex drive was non-existent despite having weaned her children more than a year before she joined our investigation.

First session. At her intake, we asked Rowena for her birth story. She had been disappointed by her childbirth experience. She wanted a natural birth, but her doctor insisted on a cesarean section because she was having twins. She was promised that her babies would be placed directly on her chest after delivery, but instead they were immediately whisked away to the nursery. She was left to recover without explanation in the company of her anesthesiologist, and it was many hours before anyone familiar came to see her. She felt demoralized and alone, like she had completely relinquished her power.

Despite requesting contact with her newborns, which she hoped would provide her with a more fulfilling and comforting birth experience after C-section, she never learned why her children were taken so abruptly from her after delivery. She reported feeling “dead inside”; she felt she never entirely recovered from this experience. She reported mild depression, suffering from body aches, constipation, and insomnia since the birth of her twins. Her goal for work with us was to gain pain-free penetration during sex. She presented an emotional component of mild but ongoing postpartum depression during this interview. In addition to any scar tissue that we might find, the domain of emotion was in need of attention and reframing.

I examined Rowena while Kinzbach took notes. I noticed her C-section incision was still raised and pink, and she reported it was painful during palpation. The right side of her incision was particularly painful, raised, and inflamed. Her right hip was also asymmetrically raised, and her right inguinal canal was tight and painful when I lightly pressed into it. Her right psoas muscle was tight. This tension spread up into her ileocecal valve, liver, and gall bladder area. She reported pain on the right side of her bladder when I pressed gently into her belly. The right side of her sacrum was tight and painful when she turned over. I checked her right obturator internus from an external approach, by pressing deeply, just superior to her right sit bone, and found it was also tight and painful.

She was reactive and jumpy when I used cross-fiber friction to address tension in her outer hip (tensor fascia latae) muscles, which confirmed that she held unresolved emotion tension in her body. I used craniosacral work, also massaging her neck and shoulders to relax her jumpy vigilance. Then I worked gently and deeply into her abdomen, releasing some of the tension from her psoas muscles. I pressed gently into her C-section scar, lightly pulling and stretching it. I used castor oil to massage her scar and worked from this incision into fascia covering her hip flexors, quads, and buttock muscles.

Kinzbach counseled Rowena about trying new sexual positions as work-arounds for painful penetration. Rowena noted that prior to childbirth she had loved the smell of her husband's t-shirts and had found his body odor to be a turn-on. Kinzbach explained about contribution of pheromones to sexual attraction, and Rowena half-jokingly wondered aloud whether pheromones had an expiration date. Since the birth of her twins, she had lost interest in sex completely because it had become painful. She also admitted

that depression contributed to her loss of sex drive. My interpretation of this exchange was that there was possibly a hormonal (biochemical) component connected to her birth experience contributing to Rowena's flagging interest in sex.

Second session. At intake, Rowena reported she slept for 9 hours straight following her previous session. This event was anomalous, as she suffered from chronic insomnia. She told us excitedly that in her home yoga practice, she had been able to "pop right up into wheel pose," a deep backbend she had not been able to even get close to since her cesarean delivery. I attributed this surprising biomechanical change to our work through the fascial tension in her hip flexors. I believed that resolution of the biomechanical tension contributed to a relaxation of the sense of emotional vigilance Rowena held in the area between her C-section scar and her groin.

She described a feeling of "overwhelming joy" returning to her life, joy that had been missing from her life since the birth of her children. She reported that a change in sexual positions had helped tremendously, reducing the sex-induced battering pain she felt in her cervix. She was also now having complete bowel movements every day, which was a dramatic change from the chronic constipation she had experienced since her delivery. I attributed this to a relaxation of tension in the fascial interface between her hip flexors and large intestine, which overlap anatomically and mutually influence each other's functional patency. I had worked deliberately in this area to release fascia and muscular tension, and had encountered emotional vigilance, which had been released with gentle, deep myofascial work, sequenced with down-regulating craniosacral work.

We moved to the massage table, where I examined Rowena intravaginally. I found scars around her linea alba (midline) where it attached to her pubic bone and could

feel the pull of adhesions in and around her uterus and small intestine, and felt adhesions fixating normal cervical movement. The cervix itself was pointed straight back and glued to Rowena's posterior vaginal wall. I found scar tissue all along the top of her pubic bone, between its top edge and the bottom of the incision from her C-section. I massaged castor oil into the posterior aspect of her C-section incision from an intra-vaginal approach, stretching adhesions gently as I applied the oil. Finally, I worked on freeing the neck of Rowena's cervix from adhesions at the back of her vaginal canal. There were also adhesions that felt like filmy spider webs adjoining her cervix to her posterior vaginal wall.

It was difficult to get the kind of tissue movement I had gotten during my work with Kimberly, due to the thickness of the adhesions I found at Rowena's C-section incision, midline, and cervix. My goal was to unwind Rowena's cervix and linea alba. As I made contact with her cervix, it seemed fixed and I was unable to get it to move. Suddenly, Rowena reported strong uterine contractions, as I continued to make contact with her cervix. This was surprising, as we had never heard of strong, spontaneous uterine contractions occurring 3 years after birth, in a non-pregnant woman before.

I could feel Rowena's cervix moving, as if it was trying to pull away from her posterior vaginal wall, and Rowena reported new and strong proprioceptive awareness of her vaginal walls, which had been numb and off limits to awareness since her C-section. She noted that bladder tightness, discomfort, and urgency she had reported earlier in this session felt much relieved. Since Rowena had a planned C-section, I had not asked if she had been allowed to labor prior to this procedure. I wondered if Rowena's uterus was completing its labor process, 3 years later.

Third session. At Rowena's third intake she told us that a lot of emotions, particularly grief and a sense of loss had been coming up for her since her last session. She said that loss and resentment were reminders that her expectations of childbirth had been disappointed, and her body was beginning to express those feelings. Until this conversation, she assumed she had been feeling weepy "for no particular reason." I wondered if her hormones were recalibrating after the uterine contractions during her previous session. These were emotional and possibly biochemical reactions to work we had done in Rowena's previous session, and I was awestruck by her body's uncanny ability to resolve its unfinished business.

As I examined Rowena inter-vaginally, her cervix was still curled backward, stuck to the posterior vaginal wall. Pain radiated up into her C-section scar as I palpated her. I worked on the adhesions holding her cervix to her posterior vaginal wall until I was able to release them. I found a distinct ridge on the posterior aspect of the cervix, presumably caused by the line of adhering tissue that fixated it. I applied castor oil to the posterior aspect of her cervix and massaged until the ridge was reduced in size and feeling smoother.

Rowena's cervix was freed from its adhesion and quickly returned to its normal position, with the os (cervical opening) pointing down toward her vaginal opening. I felt adhesions dissolve quickly this time, as I massaged around the neck of her cervix. This positional change of her cervix also happened quite suddenly. It was if her cervix knew where it wanted to go and was eager to return to its natural position. Work with Rowena provided us with valuable insights into how C-section scars can affect sexual, emotional, and digestive function. We learned how the cervix could become fixated to vaginal walls

via adhesions that we hypothesized must have extended inferiorly from cesarean incision. These adhesions were quite simple to free by manual manipulation. We also learned C-section scars could produce postural pain, and affect digestive function, causing constipation. In Rowena's case scar tissue contributed to emotional, biomechanical, and biochemical imbalances, influencing each essential domain of health for this woman. An illustration of the biomechanical aspects of working with scar tissue is provided in figure 3.9.

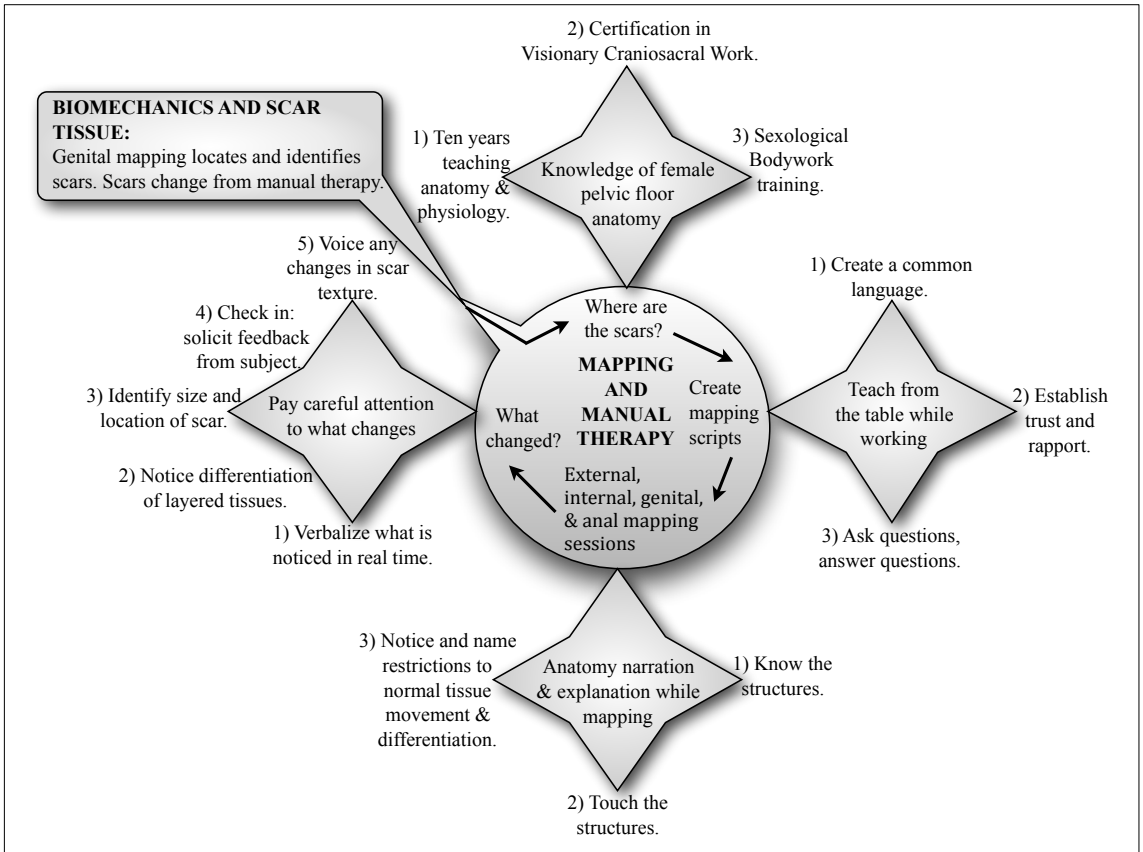


Figure 3.9. Participatory action research cycle expanded to demonstrate our premise that mapping and manual therapy were required to create an effective scar remediation protocol. Elements that contributed to this premise are constellated around each four-pointed star.

Assessment as Therapy: Hermione's Story

Hermione was referred to our investigation by her nutritionist. She reported she was gradually losing orgasmic sensation and ability. Sex was a complex subject for her,

and her sexual history had included a lot of shame, denial, and avoidance of pain. She wanted to renegotiate her expectations of intimate relationships. Hermione was in her mid-forties, had an active yoga practice, but did not fit the participant profile of proprioceptive awareness and anatomical education of the women we had worked with so far. In fact, quite the opposite; Hermione started having sex at 14 years old, and her sexual history included drinking until passing out during these early sexual encounters.

Hermione had shame associated with sex and her body, and described feeling "dirty" about her sexuality, although she reported that she disguised it, attempting bravado with past partners. She also described occasional constipation, and she admitted to over-use of laxatives. She was actively bulimic, although her binging, vomiting, and extensive use of laxatives occurred less frequently than in the past. She reported frequent panic and choking attacks, which I intuited were associated with bulimia.

First session. At Hermione's intake I took a medical history to ascertain all possible causes of scar tissue in addition to any pelvic floor injuries. Hermione had many surgical interventions during the birth of her second daughter, who was delivered with forceps. She also had surgical scars in her abdomen from both an appendectomy and ectopic pregnancy removal.

When asked for her birth story, Hermione told us she had several epidurals during labor with her second daughter, leaving her without sufficient sensation in her abdomen or pelvis when it came time to push. She was given a pelvic block in preparation for a C-section but managed somehow to push her daughter out vaginally with help of forceps, despite the additional anesthesia given to prepare her for C-Section. She got a medio-lateral episiotomy, and a vaginal "tuck," to return her vagina to "normal" because, as her

doctor explained it, her vagina was “hanging out of her body.” This suggested complete vaginal prolapse as an immediate outcome of labor. She waited for over a year before attempting sex after this birth, but still felt pain and numbness in her vagina, preferring anal sex because it was less painful than vaginal penetration.

In addition to her history of surgical procedures, Hermione had a significant history of whiplash and head trauma. She had been rear-ended at high speed on several occasions. She reported blinding headaches when she had sex, but not at other times. I suspected that the sheath and membranes surrounding her brain and spinal cord (dural tissue) were torqued, dehydrated, and adhered as a result of these car accidents. I intuited that head and neck position during sex might contribute to her report of situational headaches. Because of this, I suggested a need for neck release and craniosacral work before any work on her pelvic floor. I felt this was necessary in order to relax the tension I suspected in her neck and wanted the opportunity to unwind any dural tension I might encounter.

As I worked on Hermione’s posterior neck muscles and applied traction to separate the base of her skull from the top of her spine, I noticed that she had so much tension, they felt completely fused. I spent considerable time working with the connection between her head and neck and was able to get some space established between the two. She felt a rush of warmth all the way to her feet, which I took as a prognostic indicator that, despite previous habits of dissociation described by her early sexual history, Hermione was able to perceive the sensations of *qi* as subtle, yet crucial movements of neural transmission and perfusion throughout the capillaries of her body. Due to her history of head trauma, I had been pessimistic about whether Hermione would

be able to perceive and report such subtle sensations and was surprised and relieved when she reported these sensations of flowing and pervasive warmth.

When I examined Hermione's abdomen, I found thick adhesions all around her appendectomy scar, which ran toward her pelvic floor. Listening to my intuition, I broke with our typical sequential protocol and worked intra-anally during Hermione's first session. I found her coccyx displaced and a lot of inter-anal scar tissue. Perineal and anal scar tissue were probably caused by two episiotomies and the use of forceps during delivery.

The connection of pelvic floor scars to her appendectomy scar was more mysterious. I surmised that as active scar tissue continued to proliferate, it would be "attracted" to areas of increased inflammation. The surgical interventions Hermione described during the birth of her second child qualified as cause for substantial inflammation. I considered bulimia; overuse of laxatives, and constipation as other contributors to a local inflammatory environment in her lower bowel. I massaged all the scar tissue in Hermione's pelvic floor with castor oil, and manipulated her tailbone, coaxing it toward more centered alignment. At the end of this session Hermione reported feeling like her "head was on straight for the first time."

Second session. Hermione told us that the understanding that scar tissue could impede sexual sensation was greatly relieving to her, and that she felt "a lot less crazy" about her diminished orgasmic capacity. This had freed up a lot of emotional energy, and she noticed that her hips were more relaxed during yoga practice. She reported panic attacks were less frequent and less severe, and that choking episodes had diminished. She associated this with the work on her appendectomy scar, which "released a lot of fear."

Kinzbach's comment in the notes she took while acting as scribe during Hermione's second session intake were that Hermione was *very* talkative. I believe she was talking excessively to avoid feeling the very fear she described as having been previously "released." I had not felt any particular change in the density or viscosity of her scar tissue, which would have verified significant and authentic release.

On examination, I noticed that Hermione had a lot of tension in her jaw muscles, which I have found to be especially common in bulimic presentations. I worked with her jaw tension intra-orally, hoping to release her masseters and pterygoid muscles. The choice of intra-oral work was deliberate; in order to slow the torrent of conversation, and interrupt what my craniosacral instructor Milne has called "pewit behavior." He used this phrase to refer to the survival tactics of a ground-dwelling bird, which creates a distraction to hide its nearby nest. My intuition was that Hermione was avoiding our work rather than diving into it. I was eager to slow her down and help her feel safe enough to take the journey we had to offer during this session. I down regulated her nervous system using a variety of craniosacral techniques, and she eventually relaxed.

My next step was to palpate Hermione's appendix scar. There was still a lot of emotional holding there, which was expressed as abdominal wall and pelvic floor tension. As I massaged the tension held in her pelvic floor and approached her episiotomy scar, Hermione began to cough and cough. I asked her about bulimia. She said she had to be careful about her food choices, that if she was not eating consciously, bulimic episodes were still common. I thought that this was part of a larger emotional connection between her anal scars and her appendectomy scar. She felt she had found a way to eat more consciously by choosing to limit her food choices to mainly vegetables. She abandoned

the over-use of laxatives once she embraced veganism. I was curious to know if there was more to her pelvic floor tension than bulimia and laxative overuse.

It has been my experience that when new neural connections are being made, the process is often accompanied by nausea. This is purely an anecdotal supposition. I have often felt nausea in my own body when new sensations open up. I have queried many clients about it when we find ourselves in fresh sensate territory, and they confirm that nausea often accompanies breakthroughs into new or increased sensation. As I massaged Hermione's appendectomy scar with castor oil, Hermione found it quite nauseating. She started to tone, pronouncing the AUM syllable, which she found grounding and used as a distraction from the nausea.

At the end of this session Hermione recounted the story of losing her sister to leukemia when she was a young girl. She remembered feeling bereft, and unloved by her parents. She felt rage at them, which she turned inward toward herself as grief and despair. She acted these feelings out, initially as overeating and later as sexual adventuring, and self-medicated by drinking heavily at a young age.

As homework for this session, Kinzbach suggested that Hermione get a Taoist erotic massage from a Sexological Bodyworker colleague in order to integrate more directed, conscious embodiment into her sexual scripting. Kinzbach also suggested that Hermione take a workshop she was offering called Limbic Recoding, to renegotiate and reintegrate the loss of her sister and the traumatic birth of her second daughter. It was clear that these two episodes represented painful periods in Hermione's life, which needed more work than we were able to offer in the context of our three sessions

together. I suggested that she incorporate a daily practice of yoga nidra, a guided meditation that is helpful for recalibration of the nervous system and down regulation.

Third session. In her third session intake, Hermione told us that her orgasms when self-pleasuring were becoming deeper with more sensation. She told us she was re-thinking her approach to a future partnered relationship by allowing herself to imagine cultivating the benefits of emotional intimacy. This was a significant change from her previous expectations of relationships, which in the past had constellated around status, power, and vigorous sex without intimacy.

She noted that she was more aware of stress urinary incontinence symptoms. During the time since her last session she had lot of coughing. Her bulimic episodes were becoming less frequent and she thought it was because she was not seeking to escape her feelings through binging. She told us that her bowels had improved and she was having perfect, complete bowel movements daily since her last session.

I continued work with her head/neck communication, using gentle traction. My feeling was that her bowel improvement was a result of improved vagal flow after craniosacral work, and that resolution of both dural and appendectomy scar tissue may have positively affected ileocecal valve function. I continued work on her abdominal scar tissue, stretching it and applying castor oil. During this session, her ectopic pregnancy scar tissue seemed more palpable; it seemed to rise to the surface for attention. I also worked more on the connection between her appendectomy scar, pelvic floor tension, and adhesions connected into her rectum.

Hermione was far less talkative during her third session; she seemed more reflective, and calmer. She stated that all women needed to experience the depth of

insight that came to her during our work together, in order to reframe their sense of deserving. She pointed out a profound re-evaluation of her expectations of life and relationships. She said this was a result of having her attention continually focused on her sensations during scar tissue remediation.

Understanding the impact of scar tissue, as defined by our model of the Four Domains, allowed Hermione to locate herself and her pain in a context that held hope for resolution. Before working with us, she had pursued health from many directions, spinning and confused, looking outside of her body for answers. Even in her yoga practice, she was focused more on the relationship with her teachers than on her own embodied experience. Our gentle insistence on returning her focus to her own felt sense reassured her that the answers she sought might be found under her own skin, despite her restless cognitive striving to "understand the problem" with her head, while habitually avoiding her body. When we evaluated Hermione's experience, a new premise of "assessment as therapy" suggested itself and is illustrated in figure 3.10. The premise was that accurate holistic assessment using the model of the Four Domains was therapeutic in and of itself.

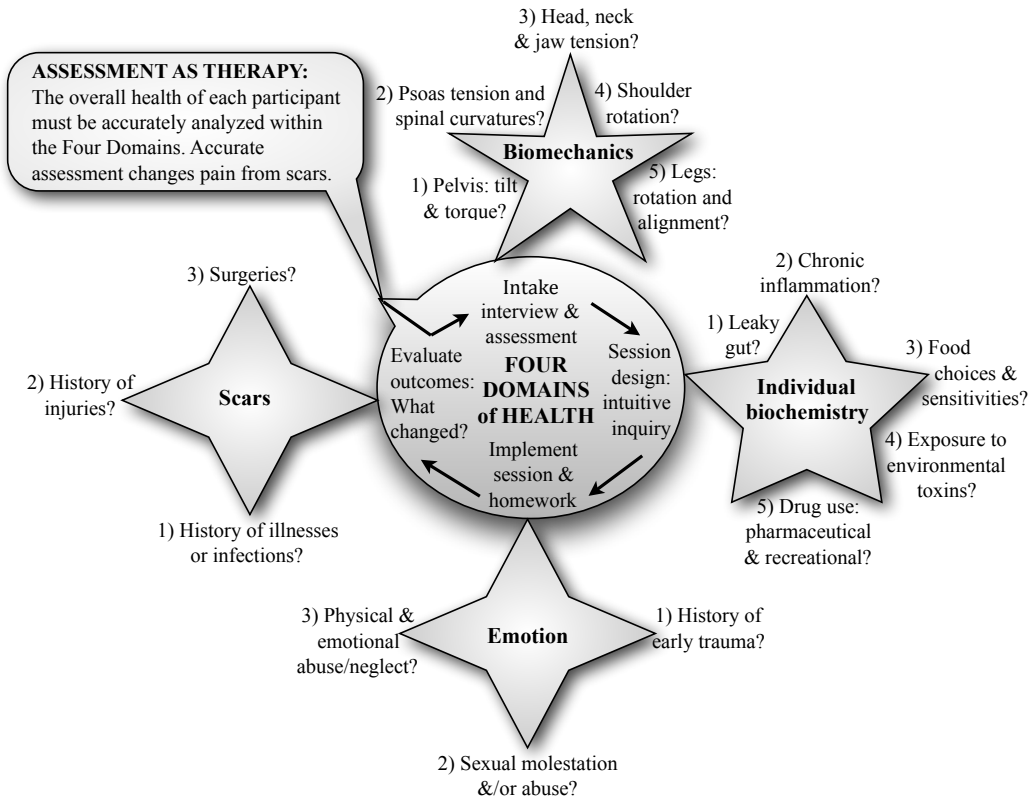


Figure 3.10. Participatory action research cycle expanded to show the development of our belief that accurate assessment itself acts as therapy, highlighting the relationship between assessment and the making of meaning as factors in scar tissue resolution.

Somatic Sex Education: Ruth's Story

I had known Ruth as a fellow student at the Shiatsu School 10 years prior to participation in our investigation. She was still a bodyworker, and now had an 8-year-old daughter. We had taken many deep tissue massage seminars together, and I recalled that Ruth had extraordinarily flexible, low-density connective tissue. In my experience working with clients with such low-density connective tissue, I heard several stories of short labors and babies born in taxicabs or ambulances. I observed that women with low-density connective tissue seem to have less intrinsic pelvic tension to deal with and quite brief labors, delivering with only a few pushes, or sometimes just one heroic (but sometimes damaging) big push.

It was no surprise to me when Ruth recounted her birth story of a very short labor; she remained un-medicated and birthed her first child with one push. Her daughter was born so quickly that Ruth had barely made it to the hospital, struggling to hold her baby in until she arrived at the emergency room. She refused episiotomy, sustaining a second-degree perineal tear. She received stitches to repair her pelvic floor. She experienced painful sex postpartum that still bothered her, 8 years after delivery.

First session. Ruth told us that she was the primary breadwinner for her family and had returned to her practice at only 6 weeks postpartum. I wondered if this had consequences for her pelvic floor strength, as bodywork requires strong core stabilization, and 6 weeks is insufficient for this core stability to successfully re-establish after childbirth. If she went back to work so soon after the birth, with her core still recovering, I wondered whether I would find pelvic floor weakness resulting from what seemed like an insufficient recovery time before undertaking the physical demands of bodywork.

Ruth reported getting hemorrhoids after the birth, an outcome of tremendous force from the single push that produced her daughter. Because of this I expected to find scar tissue in her posterior vaginal wall, and additional scar tissue in her rectum, where tears typically go unnoticed. Ruth reported applying olive oil to her own scar tissue postpartum but could not bear to look at it or really relate with it beyond rubbing oil into it the first few weeks after giving birth. Even though sex had become more painful, Ruth noticed that her G-spot had increased sensitivity and reported to us that her body image improved after the childbirth.

When Ruth got onto the table, it was evident she had not lost much of the wide-open, powerful energy she had brought to her experience during seminars at the Shiatsu School. Her posterior cervical muscles held little tension. Useful as primary assessment points for biochemical imbalance, the gall bladder points in Ruth's sub-occipital triangle were wide open, a rare occurrence in adult bodies. As I pressed into the back of her skull and asked her to breathe into these assessment points, her body rose into pronounced, spontaneous orgastic waves. This was normal for Ruth, but the body-waves quickly turned into clonisms (muscle spasms) in her hands (tetany), which told me that her energy was blocked somewhere.

As I assessed Ruth's postural muscles, I noticed she was holding tension in her hip flexors and in the internal rotators of her thighs. I worked on these muscles and their fascial sleeves. Ruth reported feeling strong waves of heat moving into her legs, and her tetany resolved, indicating that the blockage I noticed had been relieved. There was scar tissue layered between her psoas, colon, and ovary on her left side. As I worked to differentiate these structures, she felt more heat moving through her limbs, at points quite distant from where I was working. I remembered this was also common for Ruth, and attributed this to her extreme low-density, open connective tissue. I checked the back of her body for tension, being all too familiar with where bodyworkers accumulate tightness. I worked on the muscles next to her spine and into her low back. Again heat moved through her, and she said she felt more like her pre-birth self than she had in years. Ruth's assessment yielded few clues about imbalance in any of the Four Domains, due to her quick response to a relatively small amount of bodywork. I was determined to dig deeper in her next session.

Second Session. During intake, Ruth told us that she had been raised in a very conservative Christian family. Since her last session, she had begun to examine and come to peace with lifestyle choices at odds with those of her family of origin. She felt judgmental about the distance she kept from her relatives, but was coming into a new acceptance of herself, her choices and her values. She told us that one of her goals was to become more comfortable talking about sex and asking for what she wanted sexually from her husband. She also told us she was now able to look at the scar on her perineum for the first time, since the birth of her daughter 8 years before.

During intravaginal examination, I found scar tissue going deep into her vaginal floor, reaching up to and behind her cervix. I noticed significant tension in her right obturator internus and coccygeus muscles. There were adhesions as thick as my index finger in her pelvic floor, and I noticed more adhesions spanning from her pelvic floor muscles to the back of her pelvic bones. I could feel thick masses the size of blueberries in her posterior vaginal wall behind her cervix. It felt as if her cervix had torn as well; there was a raised ridge of thickened scar tissue down its posterior side. I attributed this to the force and speed of her delivery, as well as relatively low native density of her connective tissue and muscular structure. These scars melted in real time as I massaged them with castor oil.

Kinzbach took over on the table while I became session scribe, and led Ruth through a vaginal/genital mapping session. Kinzbach mapped all parts of Ruth's clitoris, vulva, and the crest of tissue on her vaginal vault commonly called the G-spot. Kinzbach taught Ruth how to do *ashwini mudra* (external anal sphincter contractions) in order to improve her posterior pelvic floor tone. For homework, Kinzbach suggested Ruth work

on her communication skills with her husband and aim for greater clarity and accountability for each of them during conversations about sex.

Third session. Ruth told us she had initiated a conversation about sexuality with her daughter, something she had wanted to do, but had been avoiding up to that point. She said she noticed some unconsciously internalized shame about sexuality due to her conservative upbringing and had avoided her daughter's natural curiosity and questions about sex. Ruth said she had finally felt ready to provide age-appropriate answers to her daughter's queries. She also told us having sex was finally pain-free and more fun than it had been since her daughter's birth.

Kinzbach and Ruth had a conversation about the history of sex negativity in her family. Kinzbach suggested that Ruth's history of familial sex negativity manifested as an inhibition in normal physiologic function and sexual arousal, and suggested that this inhibition extended to excretory function. Ruth agreed, reconfirming her lifelong problems with constipation. Kinzbach also told Ruth that lack of familial permission to talk about her body and its functions, and to express herself sexually could not only affect orgasmic access, it could also affect the progression of labor and her ability to become fully sexually aroused.

Kinzbach worked with Ruth on the table for the whole third session. She found tension in her coccygeus muscle. This was consistent with Ruth's history of problematic constipation, which had bothered her most of her life, and been a focus of particular attention during her days as student at SMSC. Kinzbach found scar tissue on and around Ruth's anal sphincters, and we assessed that she had sustained third-degree rather than second-degree tears during childbirth. Ruth said she felt a burning pain in her deep

buttock muscles, and emotional release resulted from Kinzbach's deep tissue work into the lateral rotator muscles of Ruth's buttocks.

Kinzbach pursued Ruth's release, focusing on external and intra-anal massage using castor oil. She worked with one finger intravaginal and one finger intra-anal to check the membrane between these two cavities. As Kinzbach worked on Ruth's obturator internus muscles, Ruth said she felt heat traveling into her anus, which I considered a good sign. My intuition was that the sensation of heat (*qi*) moving into Ruth's anal sphincters melted her history of emotional holding, implicated in her chronic constipation. This was a profound and fundamental change in the psychogenic pattern of tension held by Ruth's autonomic nervous system. Her chronic pelvic floor tension let go during this session, and Ruth mentioned that she was reminded of how it had felt as a young child before she learned the habit of continually holding on in this area. She mentioned that her tension seemed to be related to having to care for her alcoholic father and uncles after her mother died when she was a young girl.

Throughout all three sessions with Ruth, we chose to use mapping as an educational device to talk to her about normal sexual and physiologic function. The mapping process teased up memories about the origins of deep and unconsciously held tension in Ruth's autonomic-controlled smooth muscle tissue, including her internal anal sphincter and vaginal walls. Our conversations along with bodywork and focused attention to these areas seemed to be the key to unlocking the tension held in these tissues. We arrived at another premise, shown in figure 3.11, in our investigation of scar tissue: That somatic sex education and information about healthy physiologic sexual function postpartum were of intrinsic value.

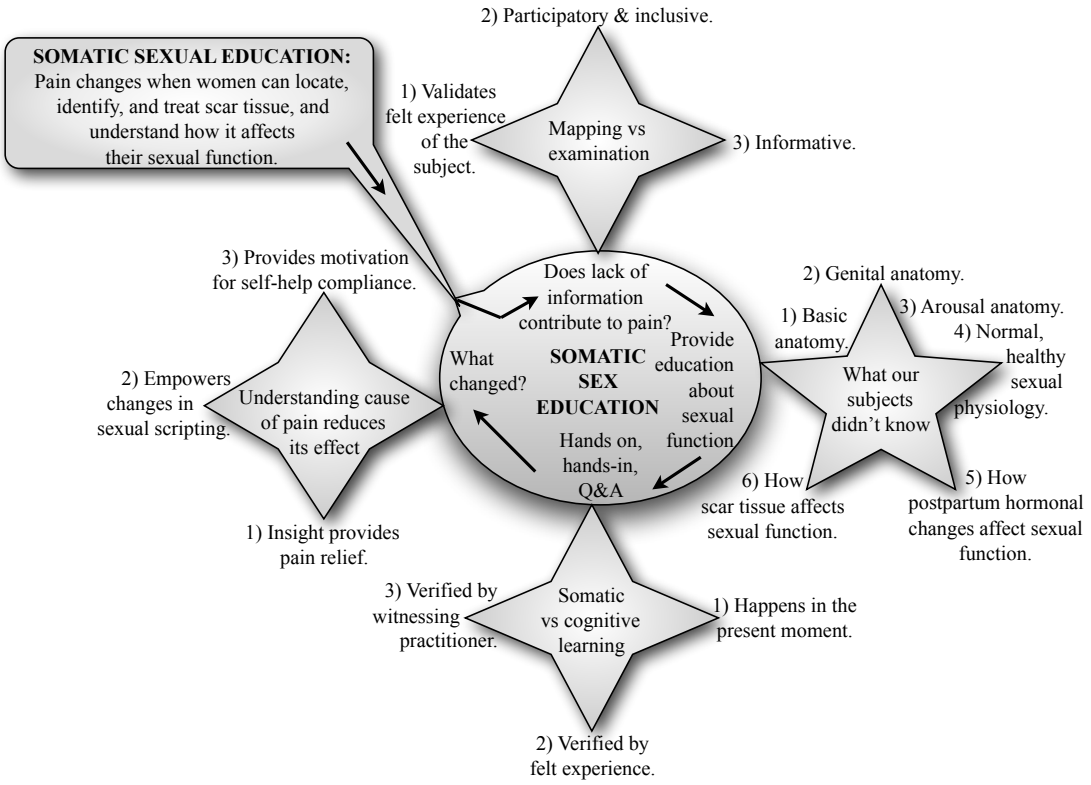


Figure 3.11. Participatory action research cycle expanded to show the development of our belief that provision of somatic sexual education is a meaningful factor in scar tissue resolution.

From Scar Tissue to Self-sovereignty: Lucky's Story

Lucky was another former student from the Shiatsu School. She birthed her first child 10 months prior to her work with us and was still breastfeeding when she joined our investigation. Like Ruth, she was also a bodyworker. She told us her postpartum attempts at sex were unsuccessful, and she considered sex too painful to try again at this point. She noted she felt disconnected from herself. She told us she felt pelvic floor pain and tightness in her outer labia when she coughed, from tears she had sustained during her vaginal delivery.

First session. During Lucky's first session, it became apparent that she was in a double bind typical of new motherhood, with competition for her attention between her

husband and her 10-month-old, with whom she was co-sleeping. Her husband wanted to resume their sex life with the same frequency and vigor that had been available prior to the birth of their daughter.

As she told her birth story, she described a 24-hour labor. She had requested an epidural at 12 hours, when she was told by her anesthesiologist to "stop being a martyr." Despite her desire for an un-medicated birth, she said she felt shamed by this suggestion, and capitulated. When she delivered 12 hours later, her pelvic floor tore in three places. Ten months later she still could not look at her pelvic floor and told us she was interested in participating in self-care but could not face the idea of touching herself "down there."

She felt as if her labor had spun out of control, with too many bright lights, too many antibiotics (an infection was suspected, although not confirmed), and the umbilical cord cut too soon. She reported feeling altogether disempowered by the experience. Her husband, her mother and two of her aunts attended her birth, but, intimidated, were unable to offer Lucky much support in the busy hospital setting.

Lucky was still breastfeeding, and during her assessment, I noticed she had internal shoulder rotation common to breastfeeding mothers. She was very tender in the gall bladder points at the back of her neck. To my hands, this was indicative of congestion in her liver, which resulted in thickened blood viscosity. She had dense, stiff, and fibrous connective tissue.

Lucky's tissues felt softer than they had when she had been my student at the Shiatsu School. I attributed this to the circulation of the hormone relaxin. This hormone is meant to soften pelvic ligaments and allow bony separation in the maternal pelvis during

birth. Relaxin circulates while women are breastfeeding, and I made mental note to use this to advantage while working on her scar tissue.

I used a shoulder opening deep-tissue protocol to work on Lucky's internal shoulder rotation and free her range of motion, and used craniosacral work for down-regulation, as she was clearly exhausted and needed rest. As I worked into her leg muscles and hip flexors, she had an emotional release, which she described as shedding tears of joy, feeling her legs shake. She reported "feeling like liquid heat." When she tried to get off the massage table she had to sit down again to get her bearings.

For homework from this session, we suggested Lucky allow her husband to do more to take care of her and allow herself to receive touch from him. Kinzbach recommended she read the book, *The Languages of Love*. It seemed apparent from Lucky's description that her communication problems with her husband represented each of them as having quite different needs. Kinzbach suggested that if each of them could define what it was that they needed and expected from the other, and communicate these needs clearly and without blame, they each might get more of their needs met.

Second session. Lucky told us things were not going well with her husband. Her jaw was very tight, and I suggested that this might be related to not speaking the truth to her husband about her needs as a new mother. Lucky retorted that her husband was sexually demanding and unsympathetic to her needs. She described him as selfish and childish.

During an internal vaginal exam, Kinzbach found scar tissue at Lucky's introitus, and taught her self-massage using castor oil. Lucky was eager to try this treatment at home, having gotten past her avoidance of looking at and touching her own pelvic floor.

As Lucky's intravaginal exam progressed, Kinzbach found the masses of blueberry-sized adhesions we had by now we associated with birth-related scar tissue. These were located inside her vaginal walls, near her obturator internus muscles. Kinzbach used castor oil to massage and break up these lumps, and Lucky's pelvic floor tone, until now quite tight and painful, started to ease. Lucky noted that Kinzbach's massage of her obturator internus felt especially soothing.

Kinzbach mapped Lucky's vulva and clitoris, pointing out the difference in sensation between the shaft, glans, and backside of Lucky's clitoris. When scar tissue began to break up, Lucky described the sensation as "heavenly." Kinzbach mapped Lucky's G-spot and the crest of engorge-able tissue located posterior to her G-spot. Kinzbach used a mirror so Lucky could locate this tissue on her own.

In addition to working manually with castor oil on her own scar tissue, Lucky was eager to explore the pleasurable sensations that she found during this new discovery of her own erotic anatomy. Lucky noted that she felt more whole, "like she was not an injured bird any more." Homework from this session was Kinzbach's suggestion to read another book, *Don't be Nice, Be Real* by Kelly Bryson, about nonviolent communication.

Third session. Both Lucky and her daughter had gotten a cold, and Lucky was fatigued, congested, and a bit "out of it" when she came for her third session. She reported having gotten into more arguments with her husband about his lack of help around the house. Lucky suggested they go to therapy together and he flatly refused. We pointed out to Lucky that we each thought she needed to do more to stick up for herself.

She explained that she was getting in touch with her anger and disappointment in the way her marriage was going, noting her husband's selfishness and infantile behavior.

She related her pelvic floor tension to feelings of anger at her husband. He was meeting her needs financially and she wanted to find a way to offer appreciation for his contribution to the household but acknowledged confusion about her internal conflict between expressing her anger and her desire to communicate appreciation.

Lucky worked on her own scar tissue with castor oil at home and noticed that her pelvic floor tension continued to improve. She mentioned that both her parents had been addicted to drugs, and that her father had been exposed to Agent Orange in Vietnam, and, after receiving money from the government, had quickly spent it all on drugs. It was easy to presume that Lucky had not had good modeling for boundary making from either of her parents. As Lucky got in touch with anger at her circumstances, she said she felt ready to do something about it and seek therapy, with or without her husband. We found more scar tissue in this session, and during her exam, I found a patch of what felt like bubble-wrap lining her vagina. I worked to loosen adhesions from their attachment points, and suddenly this tissue dissolved. Lucky reported that any remaining pain seemed to dissolve along with these adhesive scars.

Reflection and Feedback

The women we worked with in these case histories were enthusiastic about their work with us. They reported many changes in their lives and symptoms, which are documented in Chapter 4 of this dissertation. The following is a brief summary of some of the feedback we received from these brave women.

My sessions with Kimberly were similar in tone to those I had experienced with Kinzbach. They were in every sense collaborative, and a process of co-inquiry, exploration, and mutual surprise at outcome. I would make suggestions for placement of

proprioceptive attention on muscular engagement and movement or direct her attention to the emotional content of her birth injuries, and their associations to her sexual and/or family history. Kimberly answered me with her body, and accurately reported physical, genital, and autonomic responses to my suggestions. The outcome of our work together included her diastasis re-knitting, a successful resolution to her loss of PFM tone and function, and swift and positive changes in abdominal weakness. Kimberly's experience of painful penetration was also resolved, but this was not discovered until many months later when she found a new sexual relationship.

Working with Rowena, we confirmed it was possible to correct scar-related postural pain with bodywork. Without internal vaginal work, all aspects of the adhesions creating Rowena's postural and sexual pain could not have been addressed. Many women believe that a C-section will save them from sexual problems after childbirth. Rowena's postpartum experience suggested otherwise. We heard from Rowena's husband about their return to pain-free sex after Rowena's third session. Several months later she and her husband provided us with a filmed testimonial about the changes they had experienced as a couple, based on the work we had done with Rowena. She reported coming back to a more joyful state of being, happily resuming an active and enjoyable sex life with her husband.

Scar tissue remediation was doubtless helpful for Hermione. But without our conversations, which contextualized her experience using the Four Domains, Hermione would not have had the opportunity to participate in making meaning with us. She did this by sharing her insights gained from her experience of our work, and from our reflections back to her, steering her attention back to her own somatic reality. This

provided Hermione with an ability to self-witness, in a specialized context that used her scars as a point of departure for understanding herself better.

In Ruth's case, our somatic (hands-on, hands-in) approach to mapping and education improved her sex life. Contextual conversation and placement of attention freed her from unconsciously held beliefs that had not resolved previously. She had worked on herself in many ways, but despite ongoing concerted efforts on Ruth's part to address her biochemical and structural problems using a variety of intensive practices in the past, including yoga, deep-tissue bodywork, cleansing, psychotherapy, and nutritional counseling, her constipation and bloating persisted until she was able to shed new light on the emotional origins of her pelvic floor tension.

Lucky ultimately left her husband. She delivered a filmed testimonial about her work with us, where she claimed that she had stepped into her power as a result of the work she had done with us and on herself. Support for her body and the resolution of her scar tissue allowed re-evaluation to take place at this critical point in Lucky's postpartum experience. She was able to break away from familial patterns of learned helplessness and initiate a period in her life of self-responsibility in regard to self-care as well as self-sovereignty. Below, figure 3.12 illustrates the hermeneutic spiral generated thus far in our work.

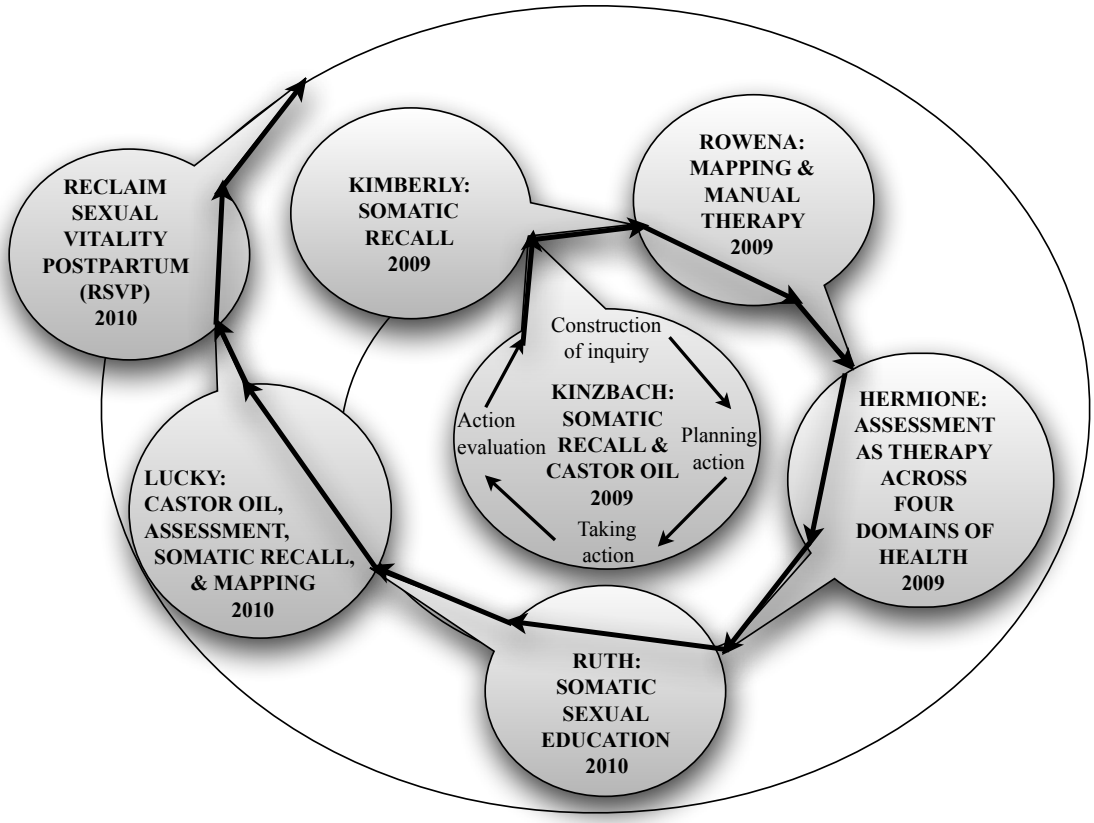


Figure 3.12. Hermeneutic spiral resulting from intuitive inquiry, describing the progression of data collection and protocol development for scar tissue remediation, education, and management.

CHAPTER 4

RESULTS

Summary

This research was comprised of a series of three scar tissue remediation sessions for each of 12 women, who experienced sexual pain after acquiring scar tissue during childbirth. Two Sexological Bodyworkers, Jessica Kinzbach (AKA Jaiya) and Ellen Heed, offered this intervention to critically investigate the resolution of sexual pain from birth-related scar tissue. Our hypothesis was that mindful palpation of scar tissue has the potential to cause immediate and dramatic tissue change. Use of the model of four essential domains of health (called hereafter the Four Domains) as a tool for holistic assessment allowed us to identify the most likely factor causing sexual pain as scar tissue, exclusive of any confounding factors among the three remaining health domains, i.e. biochemical, biomechanical, or emotional causes. Four of 12 women experienced one or more potent episodes of somatic recall, which immediately preceded dramatic changes in the density and viscosity of their scar tissue. This supported our hypothesis.

Our research question was: How might sexual pain from scars resolve as a result of somatic recall? Four women experienced episodes of somatic recall, and rapid resolution of sexual pain, which was concurrent with emotional release and a re-evaluation of personal and genital safety. Mindful scar tissue palpation and somatic sex education during session work softened scars and adhesions at the same time each woman spontaneously re-evaluated her sense of genital function and personal safety. Self-massage and castor oil treatments on scars between sessions supported these

changes, and most subjects reported a growing sense of self-agency and self-efficacy resulting from working with their own genital and abdominal scar tissue. Of 12 subjects, 10 women completed three sessions with us and provided feedback. All 10 had nearly complete cessation of sexual pain and/or significant improvements in sexual sensation, which occurred within 4 weeks of their work with us.

Subjects: Ages and Origins

Each of the research subjects was sexually active and reported sexual pain, numbness, or dissociative episodes during sex, which occurred since giving birth. The ages of the women with whom we worked ranged across 18 years, from 30–48 years old, with an average age of 38. None of our volunteers had sought help for painful sex or low desire from any other previous therapeutic or medical interventions. Nor had any of these women pursued physical therapy, surgical, or other solutions for resolution or remediation of scar tissue resulting from birth-related injuries or surgeries before joining this investigation. Five of these women's experiences are described in detail as representative case histories in the Methods chapter of this dissertation.

Exclusion of Confounding Factors

Much of the literature reviewed in this dissertation describes that how it can be difficult to determine specific causes for sexual and pelvic pain, and that causes for scar tissue are ubiquitous. In order to narrow our field of inquiry, we found it necessary to examine any confounding factors that might contribute to our subject's experience of painful sex that were not directly linked to scar tissue acquired during childbirth. We used the model of the Four Domains of functional health, described in the introduction of

this dissertation, as our guide to examine and isolate any possible confounding factors, and better explain the relationship of scar tissue to each woman's sexual pain.

Biochemistry: Hormones and Breastfeeding

Biochemical interference with normal sexual function may have been in part due to the breastfeeding status of some women in our investigation. Breastfeeding status was relevant during our work, because hormonal changes caused by breastfeeding affect libido and physiologic sexual response. Breastfeeding is characterized by Agarwal, Kim, Korst, & Hughes as interfering with vaginal lubrication as a normal part of sexual arousal (Agarwal, Kim, Korst, & Hughes, 2015).

Kinzbach noted during our initial sessions together that the inability to lubricate during sexual arousal created painful pinchy sensations during penetration. She was still breastfeeding when we first worked together, long before we initiated this investigation. Additionally, research has found that breastfeeding is associated with vaginal pain due to atrophy of the vaginal lining (LaMarre, Paterson, & Gorzalka, 2003). This is linked to increased production of prolactin and decreased estrogen levels (Pasqualotto, Pasqualotto, Sobreiro, & Lucon, 2005). Vaginal atrophy includes thinning of the vaginal lining, which is then more apt to tear during penetrative sex. Hyperprolactinemia suppresses normal estrogen, progesterone, and testosterone levels. It is thought to interfere with libido due to changes in a breastfeeding woman's personal biochemistry by disrupting her normal balance of sex hormones (Alder & Bancroft, 1988; Althof et al., 2005; Bancroft, 2005; LaMarre et al., 2003).

Three subjects were breastfeeding while they participated in this investigation. One subject had given birth quite recently, just 1 month before she was accepted into our

research cohort. Two others had been breastfeeding since the birth of their children approximately 2 years before. All the rest of the subjects' children were weaned.

Biomechanics: Postural Changes After Giving Birth

Many of our research subjects told us that their posture had changed since pregnancy and childbirth. One woman had significant diastasis recti, which measured four-fingers wide at her navel where her abdominal muscles separated from her midline during pregnancy. She told us this caused low back pain due to lack of ability to stabilize or utilize her abdominal muscles. She reported back pain when lifting her 2-year-old. This woman also reported that she was unable to deliberately engage her pelvic floor muscles, to which she attributed intermittent fecal incontinence.

Five subjects had notable internal rotation of their shoulder joints they told us resulted from holding their children during breastfeeding. This caused neck and shoulder tension, as well as headaches. Two of these 5 also complained of inter-scapular pain, which they attributed to postural adaptations to breastfeeding. Three of the subjects' neck muscles were tight enough to draw their heads forward, out of alignment with their spines, and they complained of bowel issues (fecal incontinence or constipation), chronic vigilance, insomnia and other signs of autonomic imbalance, which Medici associates with vagus nerve compression (Medici, 2013b; 2015b). Several of these women suggested their neck tension was due to the pressures of single motherhood, breastfeeding, and the muscular strain involved in carrying and breastfeeding their children as they grew.

Half of the women we worked with had abnormally tight psoas (hip flexor) muscles. They also complained of low back pain, constipation, urinary incontinence, and

sexual dysfunction. Several of these women noted that their hip flexor tension also limited access to pre-birth range of motion during their yoga practice. Rolf identified tension in the hip flexors (psoas muscle) as a potential contributor to sexual dysfunction (Rolf, 1989).

Three women had palpable tailbone displacement, which made sitting for any length of time uncomfortable. At least two of these women also complained of fecal incontinence, possibly related to tailbone displacement. Three women talked about changes in their pelvic stability, which included sacroiliac joint pain, pubic bone pain, diastasis rectus, and chronic discomfort and lack of connection to core strength in the midline between the navel and pubic bone.

Emotion: History of Trauma Prior to Giving Birth

Eight of the 12 women told us they had experienced emotional trauma prior to childbirth. Four women had been molested as children, 2 were raped, and 2 women were victims of incest. Three subjects reported receiving little to no sexual information while growing up, with 1 of those women reporting that her mother told her women were not capable of orgasm.

Two women came from strong religious backgrounds and attributed their sexual problems after childbirth in part to their strict upbringing. This, combined with embarrassment, contributed to hesitation when talking about painful sex with their partners. One woman lost a sibling while she was young and felt that some of her dysfunctional sexual behavior (promiscuity and drinking to blackout before sex as a young person) was due to this loss. Three women reported they experienced extreme and

possibly irrational fears for their children's safety when their children reached the age at which they (the mothers) had been molested or felt abandoned as children.

Subjects' history of emotional trauma directly associated with birth. Four of 12 women reported postpartum depression. One of these 4, and 1 additional woman told us they felt as if they had missed an important opportunity to bond with their children immediately after birth. All 4 women said that this contributed to feelings of helplessness, loss, and depression.

One woman reported laboring at home for 3 days without food or sleep, and a traumatic hospital transfer. At one point, as she labored in the hospital, there were six doctors, her midwife, her mother, and her husband in the labor room with her. She was in a teaching hospital and many of those present were observing students. She did not know whose hands were inside of her checking her dilation, and had to introduce herself to the doctor whose hands they were. She was prepped for a C-section, but when the entire group of doctors stepped out of the labor room to perform and/or observe an emergency C-section for another woman, she was able to push her baby out, finally having the privacy to do so. She reported a feeling of being shamed by the medical staff at this hospital.

Three of 12 subjects told us they felt abandoned by their birth attendants, whether doctors or midwives. Two felt abandoned immediately after birth, and 1 experienced feelings of abandonment in the days and weeks that passed in her postpartum period. This woman sustained a serious infection in her pelvic floor where her perineum had been stitched. This infection went unnoticed and untreated for several weeks, contributing to

pelvic floor dysfunction, including fecal incontinence, which lasted intermittently for 2 years following birth.

Relational and emotional stress resulting from painful sex. All of the women in our investigation stated that postpartum sexual pain was a deterrent to physical intimacy with their children's fathers. Seven of these women said that sexual pain caused emotional distancing between themselves and their partners. Eight subjects expressed disappointment with their mates for not being adequately helpful during the stressful months immediately postpartum.

A significant majority of research subjects admitted that relational disappointment affected their long-term intimacy: Ten of 12 women in our study group separated from or divorced the fathers of their children. Three subjects suggested that lack of sexual intimacy was one of a number of factors that resulted in the collapse of their relationships. Three women acknowledged that dissociation from painful sexual sensation during intercourse became their coping strategy in order to continue sexual relations with their children's fathers. One woman stated further that dissociation had become a habit, and that she suffered from low sexual desire, and an increasing lack of physical sensation over time.

One of the women stated that her mate would not have sex with her during pregnancy. After the birth of their child, she and her husband tried to have sex, but it was too painful. Her desire evaporated due to anticipation of painful sexual contact, and her husband sought a sexual relationship outside of their marriage. This subject reported that this, alongside her disappointment about not having sex during pregnancy, made this

relationship untenable, and divorce shortly followed. This woman came to our investigation in hopes of establishing comfortable sex with her new partner.

Scars: Before, During and After Birth

Head trauma. Head trauma is associated with neck tension, and constriction of dural tissue as well as constriction of the vagus nerve. According to Medici, this constriction may interfere with the ability to regulate the autonomic nervous system sufficiently to build and increase sexual arousal (Medici, 2011b, 2013a, 2015b). Four of 12 women in our study had head trauma. One woman had been in six auto accidents, and reported ocular migraines, for which she took medication. She also reported dissociation during sex and low sexual desire, which was part of her motivation to join our investigation. A second woman reported that she fell flat on her face as a child, knocking out her front teeth, and splitting the skin of her lip and jaw. This was a severe enough fall that she broke her arm, wrist, and a rib. She reported low sexual desire and postpartum depression, as well as dissociative episodes during sex.

A third subject had a car accident 1 year prior to our study that she reported caused concussion and chronic brain fog. She had TMJ dysfunction, which caused jaw pain, neck pain, inter-scapular pain, and frequent severe headaches. She also reported oral and facial surgeries as a child. She had experienced a traumatic 3-day labor and attributed her inability to dilate in part to problems with vagus nerve compression from chronic long-term clenching of her jaw. The fourth woman who suffered from head and neck trauma had been involved in three auto accidents, two of them at high speeds, which she described as causing serious whiplash. She told us she got blinding headaches, but only during sex. She reported dissociative episodes during sex, as well as a growing inability

to orgasm. Concern over her dwindling sexual response motivated her to join our investigation.

Surgeries prior to birth. Prior to giving birth, 6 subjects experienced significant abdominal surgeries. Three had appendectomies, and 1 of these 3 also had a previous ectopic pregnancy surgery and a "vaginal tuck" during the birth of her second child. Another woman reported an appendectomy, and also scar tissue from a birth defect that caused congestion around one of her kidneys, which she told us might be related to her low back pain. She noted that she could feel intense pulling from her pelvis into this region during her sessions with us, as well as during penetrative sex. The third woman with an appendectomy also had an ovary removed on the opposite side of her abdomen, which may have caused scar tissue that led to her sexual pain, in addition to a second-degree tear in her perineum during childbirth.

One subject had a bilateral hernia mesh repair that she reported caused pulling sensations in her groin during sex. This scar also produced strong pulling sensations during her sessions with us. Another woman had received a fusion of her L4 and L5 vertebrae due to intervertebral disc rupture, and also had a gall bladder removal during her second pregnancy. She did not report any association between her low sexual desire, dissociative episodes during sex, and these previous surgeries.

Physical trauma prior to birth. Two subjects experienced bone fractures prior to birthing. One woman had fallen, and broken her arm, wrist, and rib. She reported that her postural adaptations to this trauma caused a slight twist in her spine, and that she experienced discomfort related to spinal and pelvic torsion. The other subject fractured her sacrum 6 years prior to conception, which she suggested made a contribution to mild

low back and sacroiliac pain. She reported that her hips did not feel even, and that her leg length did not feel symmetrical.

Scars Resulting from Birth

Each of the women who volunteered to participate in our critical investigation reported having scar tissue. All participants had scars from injuries and/or surgeries directly related to childbirth; they had perineal injuries, episiotomies or C-sections. Half of the 12 women received other surgical procedures prior to giving birth. Each woman linked her sexual pain, diminished sexual desire, and problems with arousal to the possibility that birth-related scar tissue was a contributing factor to the sexual problems she reported. We found that scar tissue acquired prior to giving birth also contributed to sexual pain in 6 women. The way in which scar tissue interferes with normal sexual function is discussed in detail in the Chapter 2 of this dissertation.

Perineal tears. Most of the women in our investigation had a birth experience they described as difficult or traumatic. Ten of 12 women delivered vaginally; 2 of the 12 delivered via C-section. All 10 women who delivered vaginally reported sustaining perineal tears during childbirth. One woman had a first-degree tear, 3 women reported second-degree tears, 4 women had third-degree tears, and 2 women had fourth-degree tears. All of the women with perineal tears received stitches. One woman reported a severe perineal infection during the healing of her stitched pelvic floor that went undetected for several weeks. She believed that this contributed to her pelvic floor pain and dysfunction, which included intermittent fecal incontinence.

Episiotomy. Three of the 10 women who gave birth vaginally received episiotomies; 2 of those women had episiotomies for two births each. The episiotomies

did not prevent further tearing for any of our subjects; in fact, 3 of the 4 subjects who reported fourth-degree tears were women who received episiotomies. One woman had an instrumental delivery that employed the use of forceps and vacuum extraction. She reported sustaining a second-degree tear.

C-section. Two women had C-section deliveries. One of these women had a planned procedure and reported a variety of problems with physiologic and emotional function related to her C-section scar tissue. These included, but were not limited to, constipation, feeling as if one leg was now pronouncedly shorter than the other (she had no apparent scoliosis), insomnia, postpartum depression, and low back pain. The other woman, who had an emergency C-section, delivered just 1 month prior to being admitted into our investigation, and her incision was still healing.

Painful sex and reduced sensation since childbirth. The women who volunteered as subjects for this investigation had a variety of pain presentations associated with sexual contact. Most of the sexual pain our subjects experienced was of long standing, beginning in the immediate postpartum period, and lasting until their inclusion in our investigation. In 2 cases, it was not sexual pain, but the loss of sexual sensation, which steadily got more pronounced that motivated enrollment in our investigation.

Two women described their sexual pain as burning or searing, and 4 of 12 women reported sex felt dry and pinchy. All 6 described a reduced ability to lubricate during attempts to become aroused. One of these women was still breastfeeding 2years postpartum. Three women reported pain with deep penetration or contact with their cervix during sex. Surprisingly, 1 of these women had given birth via C-section. One

woman had a history of UTIs and described occurrence of unusual urethral sensitivity after intercourse. Another woman reported stress urinary incontinence, which interfered with sex, and lasted for many years after the birth of her second child.

We learned that painful hemorrhoids are a common outcome of intense pushing during labor. One subject told us she acquired hemorrhoids during the birth of her daughter, which she still experienced 8 years afterward, now associating them with her menstrual cycle. She noted that they contributed to perineal pain during intercourse. Another woman reported painful hemorrhoids after birth. She also experienced 2 years of intermittent fecal incontinence, which contributed to sexual problems. She attributed her pelvic floor dysfunction to a fourth-degree tear, which she thought was due in part to birthing in a standing position.

Six of 12 women said that they experienced low sexual desire that lasted far beyond 6 months postpartum. Four of our 12 subjects reported dissociative episodes during sexual intercourse. For 3 of these women, this was an ongoing occurrence. Two women mentioned that their reason for seeking participation in our investigation was that they experienced numbness and reduction of pleasurable sensation after the birth of their children. One woman reported a loss of her ability to orgasm after the birth of her second child.

Only 1 subject told us she had a history of painful sex before childbirth. She attributed this early sexual pain to a belief, held from her upbringing, that women were incapable of, and not expected to experience, pleasure during sex. She was told she would only be “respectable” if she came to marriage as a virgin. Her sexual pain resolved when she divorced her first husband, many years before the birth of her son. After her

divorce, this subject reported she learned to find abundant pleasure in sex and had been having pleasurable sex up until the birth of her child, which happened 1 month before her participation in our investigation.

Hypothesis and Research Question

During our investigation, we found results that were both anticipated and unanticipated. The results we anticipated were directly related to our hypothesis and research question. Our primary objective in undertaking this critical investigation was to discern whether episodes of somatic recall would catalyze immediate and dramatic change in the texture, viscosity, and pain related to scar tissue acquired during childbirth. The hypothesis for this research project was that: Mindful palpation of scar tissue has the potential to cause immediate and dramatic tissue change.

In my series of three initial sessions with Kinzbach detailed in Chapter 3, the outcome of two of our three sessions seemed to be linked directly to a sudden upwelling, acknowledgement, and integration of forgotten emotions. This spontaneous emergence of feeling was catalyzed by genital sensations and what appeared to be tissue memories, while she felt witnessed and held in a safe space. These experiences brought to light and reframed previously unexamined beliefs about Kinzbach's safety while giving birth.

Her birth story as she remembered it was peaceful and relaxed, but what her body remembered was quite different. During episodes of somatic recall, Kinzbach's intravaginal scar tissue, palpably painful only seconds before, dissolved so rapidly it was difficult to recall where it had actually been located—we considered this experience to be unique and improbable. We were sufficiently intrigued by what might have caused this

unexpected outcome that we decided it warranted further study, which resulted in this critical investigation.

As stated above, Kinzbach's birth narrative was quite different than what her body remembered; the story that she presented was that giving birth had been a joyous experience and that she had an ecstatic birth. Her body remembered otherwise in a spontaneous expression of emotion during palpation of intravaginal scar tissue. This prompted our investigation to find out whether the substantial difference between what mind and body remembered was limited to Kinzbach's experience. We wanted to know whether other women would have similar experiences of somatic recall, allowing suppressed memories to arise for reframing. We were particularly interested to find out if this experience was repeatable and if so, was it accompanied by the dissolution of genital scar tissue during the process of receiving manual work.

Four of 12 women in our investigation had an experience similar to Kinzbach's, and 8 others did not. Of those who experienced immediate and dramatic tissue change in combination with episodes of somatic recall, changes occurred concurrent with emotional release and re-evaluation. These women's experience required consideration of long held and previously unexamined beliefs about each woman's perception of basic safety during and after her childbirth experience. All 4 of these women were high functioning and showed few conventional signs of trauma. However, as they were confronted with the unexpected emergence of previously unacknowledged beliefs, painful sensations and emotion related to their birth experience, fundamental, dramatic, and immediate tissue change took place. The following illustration sums up the constituents of somatic recall that preceded immediate and dramatic tissue change.

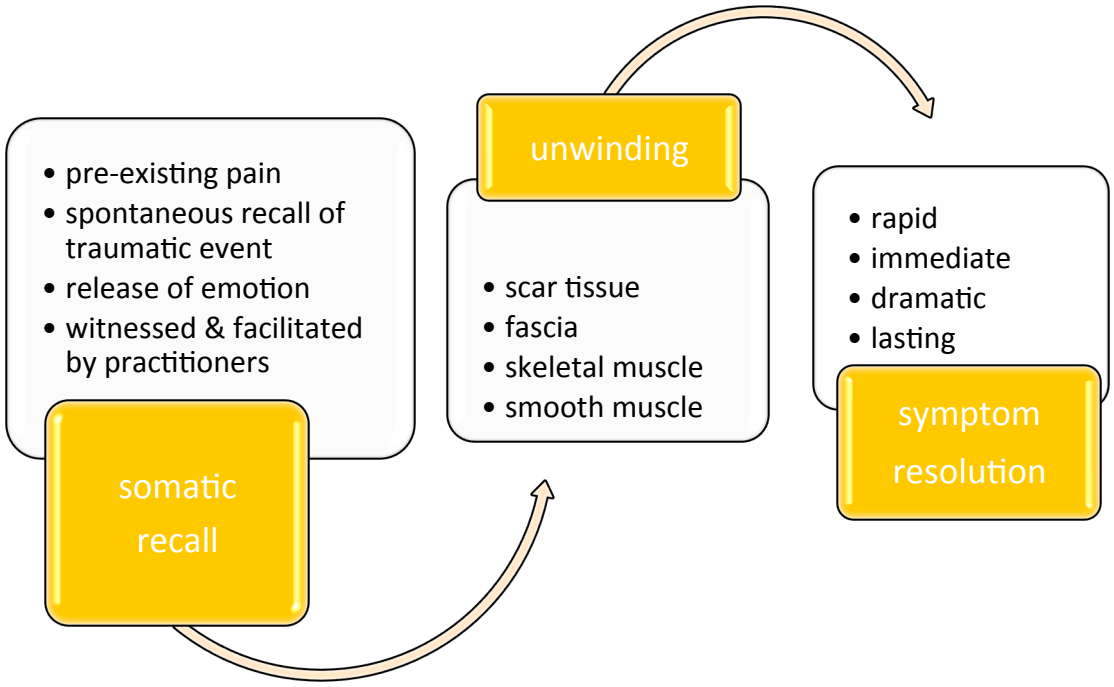


Figure 4-1 Progression of somatic recall to symptom resolution.

We described these tissue changes as tissue unwinding. Unwinding is a concept central to the osteopathic tradition, craniosacral work, and massage practice (Milne, 1995a; Minasny, 2009; Stillerman, 2008; Tozzi, 2012). It is described by Minasny as "a process in which a client undergoes a spontaneous reaction in response to the therapist's touch. It can be induced by using specific techniques that encourage a client's body to move into areas of ease" (Minasny, 2009, p. 10). Induction may be accomplished using a number of therapeutic, vocal, and bodywork modalities, including the deliberate use of tone of voice (Ogden, 2013; Porges, 2004; 2013).

We used craniosacral techniques for induction, including CV4, occipital decompression, and sacral contact prior to approaching other areas of the body that might have been holding traumatic memories. We deliberately used prosody when mapping subjects' genitals, by slowing our speech, taking more time before each new phrase, and

softening our voices slightly. This was to give the subject time to react and respond to the contact with her genital tissues and interject any questions as they arose.

In his paper about unwinding fascia, Minasny suggests that there must be continuous monitoring of the feedback provided by the body of the client in order to perceive any spontaneous changes brought about in tissues as they are manipulated by the practitioner. In our work with research subjects, there was continuous monitoring of tissue tone, movement, and energy during both induction and manual therapy as we applied it to first the whole body, and then specifically to scar tissue in the genitals, pelvic floor muscles, abdominal muscles, intestines, and reproductive organs. “Ease” can be understood to mean relaxation of local tension in these tissues, palpable change or disappearance of scar tissue, and the cessation of pain.

In our investigation, we used prosody, craniosacral techniques, and soothing massage strokes to induce a state of relaxation prior to beginning any genital contact and during the identification and mapping of scar tissue. Our intention was to induce a productive state of relaxation, similar to that of meditation, where awareness was coupled with a sense of physical safety. We sought to make attention to sensation approachable and attainable for our subjects as we palpated and monitored changes in their scars. We believed that this meditative state was necessary in order to slow things down, allow for a sense of safety, and catch the moment when emotions emerged from the body. Buddhist nun and meditation teacher Pema Chödrön describes that:

> We practice meditation because it’s a means of unwinding and dissolving the habits that limit us so that we can open our heart. It is very counterintuitive—but

> when we feel an emotion that feels totally threatening and awful, it is time to hold the experience of it. (Chödrön, 2013, p. 99)

During each of the 4 cases in which somatic recall produced dramatic and immediate tissue change, painful sensations preceded the spontaneous recall of emotional content. Our goal was to assist each subject in the identification and holding of sensations, memories, and emotions during a participatory process of scar mapping. We assisted each of our subjects to stay present by asking them to slow their breathing and stay focused on any comfort they may have found during on-table contact with us when painful memories emerged. We also slowed ourselves down and reminded subjects that they were safe.

We investigated whether emotions were internalized as patterns of tension associated with these subjects' scar tissue. We defined birth-related scar tissue as distinct patterns of tension in the web of connective tissue that surrounds and interpenetrates genitals and abdominal areas. Based on the work of Schleip, Medici, and Staubesand and Li, it was possible that this distinct and palpable tension was held as identifiable contraction within any of a number of physical structures. These included the smooth muscle investiture of reproductive organs (uterus), genitals (vaginal walls, introitus and vulva), intestinal orifices (internal anal sphincter), and local connective tissues (broad ligament, round ligaments, cardinal ligaments at the cervix, and suspensory ligaments of the sigmoid colon and ovaries), as well as in the striated skeletal muscles and layers of fascia located between pelvic floor muscles. Based on Kinzbach's experience, we expected these patterns of tension could be released by decoupling forgotten, unexamined or unconscious beliefs from excess energy held as tension within these tissues. The

mechanism for release seemed in certain cases to be initiated by episodes of somatic recall, where subjects' birth-related content reflected a period of labor during which that subject's perception of safety or survival seemed to be at stake.

Our approach as we worked with these subject's emotions is well expressed here, in a quote from Chodron as she refers to her root teacher. From Chogyam Trungpa Rinpoche: "the definition of emotion is energy mixed with thoughts. If you can let the thoughts go, or interrupt the conversation, then you have just the energy" (Chödrön, 2013, p. 99). Based on Kinzbach's experience, it was our expectation that any unconscious thoughts or unexamined beliefs subjects held about their birth experiences could be parsed and differentiated from painful scars during mapping of their genitals, abdomens, and pelvic muscles. We mapped these tissues deliberately and slowly, while directing subjects' attention to their present safety.

My training with Hugh Milne in craniosacral work supported our experience that any energy, felt as excess tension, left in the scar tissue would dissipate through an unwinding process.

> The body will tend to maintain the pattern forced on it in trauma until the pattern is first disentangled, then reversed, and finally vanquished—unwound. The amount of energy and force required to normalize a tissue tends to be in direct proportion to the velocity, ferocity, and intensity of the original trauma. The vector at which the trauma entered the tissues tends to be palpable, or even visible. (Milne, 1995a, p. 155)

Results: Case Study Synopses

Here is a brief synopsis of what changed immediately, dramatically, and permanently for each of the 4 women who experienced episodes of somatic recall they progressed through their three sessions with us.

Kimberly remembered feeling abandoned during her postpartum healing and felt her midline (linea alba) begin to twist as it unwound. The next day her rectus abdominis reknit to the connective tissue cord of her midline, her low back pain resolved, and a weak core that was unavailable to deliberate muscular contraction returned to normal function. Kimberly was then able to contract her pelvic floor muscles independently, and contract her lower abdominal muscles, both of which had been out of reach of her attempts at deliberate contraction until that session. She also reported that her pain during penetration resolved several months later, once she became sexually active.

Rowena experienced unexpected, strong, and palpable uterine contractions during her second session with us, 3 years postpartum. This occurred right after the mouth of her cervix was freed from adhesive scar tissue that tethered it to her posterior vaginal wall. We wondered if her uterus was completing its birth process years later, after Rowena's planned C-section interrupted her body's natural labor. She returned to pain-free sex after this session, with no further sensations of cervical battering, which had been the source of painful sex since healing from her C-section.

Ruth's chronic and severe constipation of over 20 years duration resolved after scar tissue work simultaneously in her vaginal canal and anus. She reported suddenly remembering what it felt like to be free of intense constraint in her anal sphincter, while feeling warmth as it flowed into her anus. This area had been out of reach of her somatic

perception until that time. She reported that she related her chronic anal tension to feelings of constant concern for her performance while caretaking her alcoholic father and uncles after the death of her mother as a young girl. She had given birth suddenly and violently with only one push, barely making it to the hospital after the onset of labor, and feeling she had to "hold herself together" so she could deliver her baby in the hospital rather than the ambulance.

Lucky found her power and her voice during three sessions with us. In her final session, she had a profound experience of change. Deep intravaginal scar tissue, which, during palpation immediately before beginning manual therapy had felt like tough bubble-wrap, suddenly began to unwind and melt. She said she no longer felt like an injured bird, felt emotionally confident, and that she understood she could no longer tolerate bullying or sullen behavior from her husband. She said that she felt ready to face the challenge of asking for what she wanted from her husband in terms of additional support with household tasks and childcare. She reported feeling slightly shaky but relieved, and although her legs felt a bit wobbly, they were her legs, and she knew she could rely on them.

Unexpected Results

More detailed case studies for each of these 4 women are presented in Chapter 3 of this dissertation. Eight of the 12 women in this investigation did not have a distinct experience of somatic recall leading to immediate and dramatic tissue change. However, they reported a variety of unanticipated benefits resulting from their sessions with us. These are outlined below.

Somatic Sex Education Resolved Dissociative Episodes During Sex

Four subjects complained of dissociative episodes during sex. They all reported that this occurred because of painful sex after giving birth. One subject did not provide us with feedback after her sessions. One of the 3 remaining women told us that dissociation was an intermittent problem since her first sexual explorations as a young teenager, although she reported that she felt more connected to her partners after reaching adulthood. The remaining 2 described their sexual lives prior to childbirth as enjoyable and were disappointed they lost sexual sensation and desire as a result of painful sex. These 3 women reported they returned to their former ability to be present and experience pleasure during intimacy with sexual partners.

Sexological Bodywork uses genital mapping as a basic tool for education about genital names, locations, and functions. Many women do not have this basic information and are unaware that they are missing vital information about their sexual bodies and potential. Three subjects in our investigation described feelings of numbness, and lack of presence during sex with partners after giving birth. Two of these women also described feelings of shame associated with their sexual lives prior to childbirth, although they described pre-birth sex as pleasurable.

All research subjects were encouraged to talk about their feelings about their bodies, and we explored what may have contributed to any feelings of shame during the process of genital mapping. Genital mapping is carried out as naming and describing the sexual function of each part of the genital pleasure network, during palpation by the practitioner. As each part is named and described, a mirror may be used so the woman

can see her genitals while learning each genital part's function. Looks of wonder and expressions of awe are commonplace during this process.

Drawing on the language of Almaas, Joseph Kramer, who wrote and regularly updates the Sexological Bodywork training curriculum, explains that many people experience a "genital hole," or lack of conscious association to their own genitals (Kramer, 2011). Almaas describes the genital hole as "a hole or deficiency [which] is simply an unconscious body image of having no genitals or no sexuality" (Almaas, 1998, p. 141). Deliberate examination and palpation of genital tissues during a mapping session engaged active participation of each subject through naming and understanding the physiologic function of each aspect of her genitals. These mapping sessions included visible tissues as well as erectile tissue beds that are deep to the vaginal mucosa. We observed that as the series of mapping sessions progressed, each of the 3 women who reported lack of sensation or dissociative episodes, integrated her experiences of somatic sexual education during scar mapping. Later, each reported that she was able to return to attentive presence during sex, whether with herself or her partner.

Our work together provided a unique opportunity to have three people's attention (Kinzbach's, mine, and her own) focused on each woman's genitals. In Certified Sexological Bodywork (CSB), this is part of what is identified as Witnessing, and is offered by CSB practitioners as a discrete skill to enhance clients' sexual embodiment. Sexological Bodyworkers are trained to witness their clients masturbate, and to offer only their own subjective and non-judgmental feedback, if any.

Kinzbach suggested that our quality of non-judgmental attention amplified each woman's experience of her sensations. The result was an opportunity to notice where and

when she habitually gave in to distraction, shame, and disconnected from herself or her partner during sex. By identifying, discussing, and reframing such moments during session work, women in this investigation were encouraged to notice and let go of habitual patterns of distraction and shut-down associated with genital contact.

These 3 women described how somatic education was the most valuable aspect of their experience working with us. Each of them told us the genital mapping process gave her a chance to re-evaluate patterns of unexamined sexual shame, which she had not expected to encounter. Understanding that shame played a part in sexual distraction was a novel outcome that Kinzbach and I had not anticipated during our initial work together. Illustrated below is a graphic representation of the results these 3 women reported from their work with us.

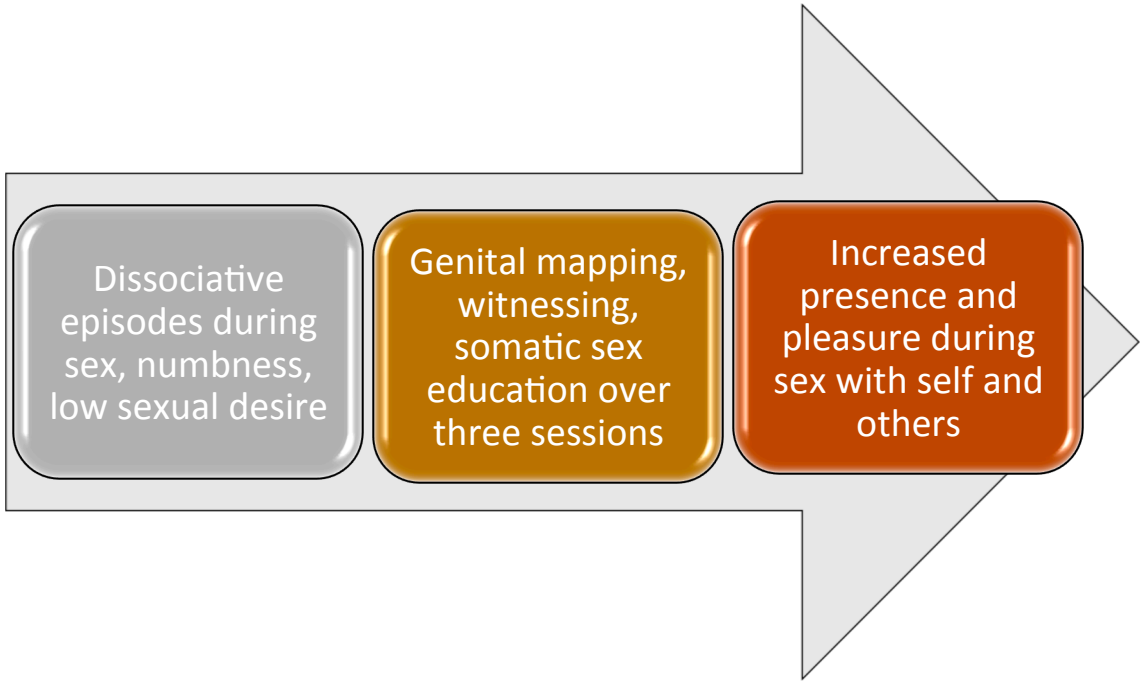


Figure 4-2 Progression from dissociation to increased presence using genital mapping.

Manual Therapy with Castor Oil Resolved Sexual Pain over Time

Two women reported that their sexual pain diminished gradually over time during their course of three sessions. We attributed this to the repeated use of castor oil, along with self-help massage these women used on themselves. This was in addition to the manual therapy we applied during in-person sessions. As noted in Chapter 2, castor oil has a rich array of research documenting its anti-inflammatory, antibacterial, antioxidant, and analgesic qualities.

We taught the women in our investigation with particularly resistant and over-resilient, rubbery scar tissue to use castor oil-soaked tampons intravaginally, castor oil-infused flannel packs on external scar tissue and abdominal adhesions, and to apply castor oil manually, by massaging it into their genital, vaginal, perineal, and abdominal scars. All subjects were compliant and used castor oil on average two or three times each week between their sessions. They reported beneficial results and a gradual reduction of painful sex as the weeks progressed.

Kinzbach and I observed that castor oil application used as self-help outside of bodywork sessions were successful in reducing pain and local swelling during our initial sessions. However, we also learned it was possible for mucosal membranes to sensitize to overly frequent application. Kinzbach used castor oil daily at first, thinking using it more often would provide better and faster relief. We observed that when she cut back to one 20-minute intravaginal application every 2 or 3 days, burning and itching ceased to bother her. We advised the women in our investigation to use castor oil no more frequently than once every other or every third day. There were no reports of burning or itching sensations among the subjects in our investigation.

Assessment as Therapy Promoted Personal Empowerment

Two women in our study commented that seeing their sexual pain as part of a larger assessment picture allowed them to let go of their fears and concerns about their pain. They emphasized that by understanding that pain was the outcome of imbalanced relationships in and between each of Four Domains, empowered them to choose to take better care of themselves. They told us they now had the guidance and information to take greater personal responsibility of their own healing.

During her intake process, 1 woman was able to make connections between several different aspects of health, which she had not previously considered to be related. During her three sessions, she was able to track the progress of her improving gut health and connected this with her lack of desire to binge eat, which she defined as one way she habitually dissociated. Surprisingly, she acknowledged that acceptance of all of herself meant letting go of her judgment about binging. This brought an unexpected improvement in her quality of attention to sexual sensations. She noticed that by feeling more at ease in her body, she came to accept herself more fully and to withhold harsh judgments about behaviors that she had recently condemned as personal failures of will. She also attributed resolution of dissociative episodes during sex to this process of self-acceptance and the context afforded her by use of the Four Domains model.

Another woman was enthusiastic about her ability to see the connections between her sexual history, her present state of depletion after a recent childbirth experience, and how she denied her needs systematically in her current relationship. She attributed these insights and the integration of sexual self-acceptance to being accepted by us without

judgment in her depleted postpartum state; it was just 1 month after an emergency C-section.

She was able to see that she could take better care of herself and deserved to do so. She took proactive steps to improve her self-care, beginning with self-massage sessions at home using castor oil. As her incision began to improve, so did her self-image, and she was able to re-evaluate early sexual experiences without the shame and early religious conditioning that had once distanced her from her sexuality. She came to appreciate her genital tissues as beautiful and include them in her personal map of self.

These 2 women reported that they were able to utilize their session work with us to re-contextualize sexual pain. Understanding why they had pain was sufficient to reduce worry, anticipation, and expectations about the recurrence of painful sex. We called this process "Assessment as Therapy," borrowing this phrase from Price and Blake's 1999 paper of the same name (Price & Blake, 1999). These remaining 2 of 6 women who did not have the experience of somatic recall and rapid dissolution of scar tissue, were able to re-contextualize their sexual experiences so they ceased to cause them fear and worry.

CHAPTER 5

SUMMARY, DISCUSSION, AND RECOMMENDATIONS

Summary

This dissertation examines the impact of adhesions and scar tissue on the sexual lives of a small sample of women, and how we sought to identify, address, and decrease sexual pain resulting from these often invisible problems. Many women report the experience of painful sex after childbirth. The actual prevalence of long-term sexual pain related to scar tissue as a result of birthing is unclear, yet ample research recognizes scar tissue as a natural consequence of the surgical interventions and/or pelvic floor injuries acquired during childbirth. Although certain pelvic and abdominal adhesions are classified as congenital (pre-existing as maternal conditions), a greater prevalence of adhesions results from abdominal and pelvic floor surgeries, including episiotomies and C-sections. C-section delivery, episiotomy, and perineal injury are scar-producing outcomes for up to 83% of women who give birth (Leeman & Rogers, 2012).

It is surprising and problematic to have found so few available studies of the long-term impact of birth-related scar tissue on the sexual lives of this sizeable population. This critical investigation explores the connection between painful sex and birth-related scar tissue. It also considers the pervasive occurrence of birth-acquired surgeries, and injuries related to certain labor-room practices, which are statistically associated with maternal intra-abdominal and perineal trauma. There is further inquiry into non-birth related causes for pelvic and genital trauma, and how each of these might affect women's sexual pain and interrupt the physiology of pleasurable genital function.

Many women report their doctors tell them they are fine to resume sex after their 6-week postpartum check-up. If or when these women complain of painful sex, they report being told no pathology can be found to explain their pain. I found little acknowledgement of birth-related scars as problematic in literature devoted to sexual pain. I found even less information about treatment for birth related scar tissue in literature from conventional providers of obstetric and gynecological care. Conventional providers who acknowledge and offer treatments for birth-related scar tissue typically offer treatments of a surgical nature. However, they do not always resolve the problem of scar tissue, but rather contribute to making more if it.

Literature about connective tissue and wound healing supports the theory that pathological scars and pelvic adhesions engender a variety of physiological impairments, which include abdominal obstruction, fallopian tube occlusion, and ovarian adhesions to the peritoneal wall. However, the examination of any connection between scar-related problems and women's sexual function, particularly as it affects sexual pleasure, appears to be sparse. The problem of scars and their effect on women's sexual lives seems to be hiding in plain sight.

In order to avoid confusion about the cause and effect nature of scars, reduced sexual pleasure, and sexual pain, I utilized a model defining four domains of health, which are essential. The Four Domains model suggests not only sexuality, but quality of life overall is determined by these four elements, which must exist in a well-balanced state to facilitate health. These domains include emotional health, postural or biomechanical health, and biochemical health. The healthy resolution of physical scars from physical injuries represents the fourth domain of this model. Each of the Four

Domains is essential in that they may not be reduced any further as causative factors for pain. The use of these domains functions as a lens through which scar tissue may be identified and isolated as a factor that inhibits pleasurable genital sensitivity and underlies many instances of sexual pain.

Problem

To understand how scar tissue affects overall health, including women's sexuality, an in-depth look at inflammation, wound healing, adhesion formation, and pathological scar tissue is undertaken. Scars are health-limiting variables that affect the function of the entire body, from macro to micro levels. These include, but are not limited to, sub-cellular, cellular, organ, glandular, myofascial, musculoskeletal, and reproductive/genital system functions. Negative effects of scar tissue disrupt the necessary balance between the emotional, biomechanical, and biochemical domains of health.

Conventional medical perspectives once defined fascia as inert filler material but are giving way to a paradigmatic shift that recognizes body-wide communicative functions for this pervasive connective tissue. The dynamic behavior of connective tissue components impacts the creation of scar tissue at a sub-cellular level, and vice versa. In addition to investigating this reciprocal relationship, biophysical research suggests that communication functions of fascia may be an evolutionary precursor to the nervous system (Becker, 1990; Ho, 1997; Oschman, 2006; Oschman & Pressman, 2014; Wang, Tytell, & Ingber, 2009). Scars block this primordial communication in addition to regular neural signaling, blood circulation, and tissue drainage. This has profound implications

for the healthy function of all tissues, including women's reproductive organs and genitals.

New research about fascia, including its dynamic communication properties and behavior at submicroscopic levels, spreads across anatomical, physical therapy, osteopathic, and conventional allopathic literature. This research is examined in depth with the role of pathological scars as aberrations of normal wound healing closely scrutinized. Promising new studies visualize, describe, and quantify the effects of non-surgical manual treatment for scar tissue (Alvira-Lechuz, Espiau, & Alvira-Lechuz, 2017; Comesaña et al., 2017; Rodríguez & del Río, 2013). However, treatments reported in this research have yet to make a difference for the many women who suffer from a loss of sexual sensation or painful sex from birth-acquired scars.

Accumulating evidence suggests that many abdominal, pelvic and sexual pain syndromes, whose etiologies have recently been redefined in the DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition), originate across a variety of interrelated sources, rather than single-source pathologies (American Psychological Association, 2013). Comprehensive publications about sexual pain acknowledge that these multi-dimensional etiologies blur lines between psychosocial and pathological geneses (Balon, 2011; Engeler et al., 2013). The model of the Four Domains suggests that each domain of health (biomechanics, emotions, biochemistry, and scars) acts as a global influence on women's sexuality and pain. With the exception of the model of the Four Domains, recent redefinitions of genital pain, however comprehensive, do not recognize much less isolate birth-related scar tissue as a contributor to sexual pain, and there remain few non-surgical options for women with pain from birth-acquired scars.

New approaches to pelvic and sexual pain treatment suggest that a multi-disciplinary, integrative approach is required to successfully address pain with etiologies shared between health domains that were formerly considered to be quite distinct. Complementary and holistic health modalities that include physical therapy, osteopathy, chiropractic, and acupuncture each acknowledge the damaging effects of scar tissue and provide treatments for it. Unfortunately, these professions are not equipped to provide the holistic sexual education or hands-on treatment necessary to change the impact of birth-acquired scars on women's psycho-emotional and sexual lives. Cognitive behavioral therapy acknowledges the role of trauma as important in the treatment for sexual pain but does not typically include educating women about normal healthy sexual function. Furthermore, a thorough understanding of women's sexual physiology and acknowledgement of access to pleasure as central to sexual health is underrepresented throughout the provision of most of allopathic and holistic care.

Many women report feeling uncomfortable about their own sexual pleasure, whether speaking to their gynecologist or their holistic provider. Women describe lacking the self-permission, self-knowledge, and anatomical language to describe the location of their sexual pain or lost pleasure. When they make an attempt to do so, being told that no discernable pathology could be found to explain these issues leaves them feeling at a loss for help.

Methods

Two Sexological Bodyworkers, each certified by the State of California, conducted a critical investigation of the impact of birth-acquired scar tissue on the sexual lives of a group of 12 women. This research was conducted using scope of practice

conferred within the State of California, which recognizes the ability of Sexological Bodyworkers to touch genital and pelvic floor tissues for purposes of education. We questioned whether rapid resolution of painful sex related to birth-acquired scars was repeatable, after we observed this unexpected result during initial work together as professional colleagues.

The purpose of this research was to investigate sexual pain related to scar tissue, and to develop protocols for both professional use and self-help treatment at home. In pursuit of effective help for 12 volunteers from our community, we searched for research methods that would allow us to pursue this unknown terrain and provide structure for our investigation. We needed a methodology that facilitated the process of transforming certain assumptions—based on our previous personal and professional experience—into treatment protocols. We anticipated that the protocols we developed would contribute to an emerging body of knowledge about the causes, effects, and resolution of sexual pain from childbirth-acquired genital and pelvic scar tissue.

We chose a research paradigm that employed mixed methods, including methodologies common to both education and transpersonal psychology. These methods included both participatory action research (PAR) and intuitive inquiry (II). The use of the model of four domains of functional health served to identify and isolate birth-related scars from other confounding factors that might contribute to sexual pain reported by subjects.

Participatory action research. Participatory action research (PAR) was our primary research methodology, which uses a four-part iterative cycle that includes 1) inquiry, 2) planning action, 3) taking action, and 4) evaluation of the information

gathered during that single iteration. Use of each single research cycle generates new questions, which in turn generate other connected, continuous cycles. These cycles spiral upward until the initial question is answered and contextualized. Based on previous training and professional experience drawn from each of our private Sexological Bodywork practices, five specific assumptions were utilized and analyzed during this investigation. These assumptions formed the basis of the protocols we used, which got a variety of unexpected and dramatic results.

The first assumption was that scars must be contextualized, by placing them within a larger view of health. Each woman's pain must be accurately positioned and identified within four essential domains, which define overall health as well as sexual health. If an in-depth holistic assessment of sexual health was undertaken for each research participant, this assessment would identify, differentiate, and isolate scar tissue from other confounding factors, determining whether it was a causative factor for each woman's sexual pain. The protocol we created to address this was a thorough intake interview process and series of physical examinations. We labeled this process "holistic assessment." Assessment forms can be found in Appendix D of this dissertation.

Our second assumption was that scars could change resulting from educational interventions. We found that sexual pain changes when women can name, locate, and identify their sensations, or lack thereof, related to scar tissue and understand scar tissue's potential effects on their sexual function. We utilized our knowledge of genital anatomy and refined it in dialog form during genital mapping sessions with subjects to help them better locate and describe their pain and/or numbness. Subjects learned to accurately describe their genital sensations, and pinpoint locations for them. They reported

understanding the relationship between these sensations and how scars had changed their pelvic floor since childbirth. We labeled this protocol “somatic sex education.” This protocol used a series of mapping scripts during hands-on work, for purposes of identifying scars and educating subjects about normal, healthy sexual function. Mapping scripts may be viewed in Appendix B.

The third assumption was that scars change from manual interventions. While the genital mapping process located and identified scars, we found that scars changed, and sexual pain was reduced resulting from the use of manual scar remediation techniques. We expected that if our mapping processes were thorough, the use of genital, abdominal and pelvic mapping would locate and identify any problematic scar tissue related to childbirth. We then developed a protocol for manual manipulation of the scars we found. We called this process “mapping and manual therapy.”

Our fourth assumption was that scars change from topical application of castor oil as an intervention. We observed that scar tissue changed after applications of castor oil into and onto the vaginal mucosa during manual manipulation. We used topical applications of castor oil during research sessions, and subjects used castor oil at home over the course of 3 to 5 weeks. We assumed that if castor oil were used in both clinical and home applications, the continuity of castor oil application would assist the resolution of painful sex related to scar tissue. We developed protocols for both in-clinic and home use that included passive and active applications of castor oil.

Our fifth assumption was that scars have the potential to change rapidly, concurrent with peer witnessing of spontaneous emotional release and integration. We often found that forgotten emotions and memories emerged during palpation of scar

tissue, as if embedded in the tissue itself. We observed that episodes of somatic recall initiated rapid resolution of sexual pain when witnessed. We developed a protocol using specific presencing skills, which allowed us to notice, make space for, and reflect on episodes of somatic recall with research subjects. Subjects reported the peer witnessing aspect of these episodes encouraged them to re-evaluate their sense of personal and genital safety. We labeled this "witnessing episodes of somatic recall." This phenomenon formed the basis for our hypothesis and research question. Our hypothesis was: Mindful palpation of scar tissue has the potential to cause immediate and dramatic tissue change. Our research question was: How might sexual pain from scars resolve as a result of somatic recall?

Intuitive inquiry. Intuitive inquiry is a research method traditionally used in transpersonal psychology that blends mindfulness and intuitive noticing. In our case, it provided a safe container for the fierce curiosity and pioneering spirit we brought to the pursuit of identifying the physical and emotional scars resulting from traumatic birthing experiences. Intuitive inquiry skills permitted reframing these experiences so that authentic sexual and sensual embodiment could become available once again to our research volunteers.

The physical and sexual nature of our subject's pain required that our methods respect a strong reliance on intuition during this research. The use of intuition was required, in order to respond with sensitivity to the emergence and manifestation of each woman's changing relationship to her sexuality and childbirth experiences. This need made intuitive inquiry an obvious choice as part of our research methodology. Intuitive inquiry encouraged one's own felt experience as a valid measure of truth. We felt it was

important that we include a methodology that respected our subject's and our own sense of internal somatic validity, as it is felt and known in one's own body.

Intuitive inquiry (II) uses five iterative phases. The first phase includes selection of a text or imagery on which to focus study. We chose a visual representation of the four domains of functional health. The second iteration is one of reflection upon the image or text. Success over 10 years of clinical somatic sexology practice has taught me to keep my focus squarely on the Four Domains to accurately identify, contextualize, and address the various issues brought to me by my clients, as well as these research subjects. The third iteration of intuitive inquiry has three factors: The first is the best source of data for research, the second is the selection criteria for research subjects, and the third is the data collection method. These are described in the Methods Chapter of this dissertation.

The fourth phase of II is a review and interpretation of the data collected, including a process of rigorous interrogation of the validity of any discoveries made. The fifth and final iteration of II is a reflection on the totality of the research, leading to a contextualized understanding of the research as a completed entity. The entire project can be then viewed as a series of hermeneutic spirals. An illustration of this spiral is presented at the end of Chapter 3.

Results

In our critical investigation, we worked with a convenience sample of 12 women over the course of 6 months. Each research subject was sexually active and reported sexual pain, numbness, or dissociative episodes during sex that started occurring since giving birth. The ages of the women ranged across 18 years, from 30–48 years old, with

an average age of 38. The women in our study had given birth either one or two times, with no reported stillbirths.

Hypothesis and research question. Our research objective in undertaking this critical investigation was to discern whether episodes of somatic recall in research subjects would catalyze immediate and dramatic change in the texture, viscosity, and pain produced by birth-related scar tissue. This unusual phenomenon occurred during our work together as professional colleagues prior to undertaking this research project. During our investigation, we found results that were both anticipated and unanticipated. The results we anticipated were directly related to our hypothesis and research question. Our hypothesis was that mindful palpation of scar tissue has the potential to cause immediate and dramatic tissue change. Our research question was: How might sexual pain from scars resolve as a result of somatic recall?

Results. What speaks for this hypothesis is that of 12 women, 4 (33% of subjects) experienced immediate and dramatic tissue change during the course of three sessions with us. Each of these 4 women experienced one or more potent episodes of somatic recall, which immediately preceded dramatic reductions in the density and viscosity of her scar tissue. Additionally, each of these women experienced a cessation of sexual pain following these episodes. Of 12 women, 1 provided no feedback, and another dropped out of the study. Six of the 10 remaining women did not have a distinct experience of somatic recall that led to immediate and dramatic tissue change. However, each of these 6 women reported a variety of unanticipated benefits resulting from their sessions with us.

Two women related that somatic education was the most valuable aspect of their experience. They told us that the genital mapping process gave them a chance to

acknowledge and re-evaluate patterns of unexamined sexual shame, which they had not expected to encounter. Another 2 women reported that their sexual pain diminished gradually over time during their course of three sessions. We attributed this to the repeated use of castor oil, combined with manual therapy that these women used on themselves in addition to the manual therapy we applied. (See the Review of Literature for more information about castor oil.) The remaining 2 women commented that seeing their sexual pain as part of a larger picture allowed them to let go of their fears about that pain. They emphasized that understanding pain as the outcome of imbalanced relationships between the four domains of health provided motivation to take better care of themselves, by undertaking increased personal responsibility for their own healing.

Discussion

In this critical investigation, -4 of 12 women experienced immediate and dramatic change to their birth-related scar tissue. This took place during a course of three sessions that occurred over a period of 4 to 8 weeks. Rapid tissue response of this kind was completely unfamiliar to us prior our own scar tissue remediation sessions, conducted by Heed working on Kinzbach, which provided impetus for this study. Before teaming up for this research, each of us had spent many thousands of hours in our respective hands-on, hands-in bodywork practices. Neither of us had ever encountered anything like the immediacy of change we felt, first in Kinzbach's, and later in 4 subjects' genital and perineal tissues. We wanted to explore what might explain this phenomenon.

A potential explanation for subjects' rapid scar tissue conformational shifts, in addition to mechanisms for how memories might become embedded in connective tissue, were provided by research published by Mae-Wan Ho. This research came out of her

Bioelectrodynamic Laboratory at the Open University in the United Kingdom. Ho's 1997 paper provided insight into how rapid tissue change might be catalyzed during the recovery of body-based memories (Ho, 1997). After Kinzbach's rapid tissue change, we anticipated that a process such as this might be initiated during manual remediation work. It is well established that scar tissue is made of collagen. In her influential work, Ho describes quantum sub-molecular behavior of the collagen matrix as dynamic under certain conditions. Ho differentiates "brain consciousness," which she describes as neurologically derived, employing neural pathways, from "body consciousness," which is derived from the ability of collagen to initiate rapid "jump conduction" of protons at subatomic levels. This generates information that is distinct from neural information and is moved rapidly through the connective tissue matrix. Based on the work of R. O. Becker, Ho suggests that collagen's conductive abilities transfer information 200 times faster than the nervous system and prime the brain for incoming neural information (Becker, 1990; Ho, 1997).

> Up to 70% of the proteins in the connective tissues consist of collagens that exhibit constant patterns of alignment, as characteristic of liquid crystals. The liquid crystalline nature of the continuum also enables it to function as a distributed memory store. The proportion of bound versus free water on the surfaces of proteins are known to be altered by conformation changes of the proteins. Proteins undergo a hierarchy of conformational changes on a range of time scales. They can thus be triggered to undergo global conformational changes that will, in turn, alter the structure of bound water. As the bound water forms a global network in association with the collagen, it will have a certain degree of

> stability, or resistance to change. The corollary is that it will retain tissue memory of previous experiences. The memory may consist partly of dynamic circuits, the sum total of which constituting the DC [direct current electrical] body field. Thus, consciousness is distributed throughout the entire body, brain consciousness being embedded in body consciousness. Brain and body consciousness mutually inform and condition each other. (Ho, 1997, para 15–16)

Subjects who experienced sudden conformational changes in scar tissue presented to our investigation within a time range of 2 to 8 years between giving birth and volunteering to work with us. We questioned whether scar tissue may have held a dynamic circuit of unconscious body memories as bound water patterns on molecularly stable collagen. In these subjects, this dynamic circuit was resistant to change until gently provoked during manual work. We speculate that changes to the stable liquid crystalline alignment of collagen, as Ho describes above, could have been catalyzed into conformational change by the unexpected and spontaneous emergence and reframing of traumatic memories.

The sudden upwelling of body-based memory happened concurrently with the rapid and tangible conformational change of scar tissue we felt so clearly. In addition, the use of castor oil, along with manual work, could implant new biochemical and biomechanical information into scarred connective tissue. Spontaneous emergence of body-based memories, manual work, and the actions of castor oil could each contribute to the rapid tissue transformation that transitioned dramatically between Ho's body consciousness and brain consciousness, as subjects felt, re-evaluated, and renegotiated their birthing stories, scars, and pain.

Traumatic memories arose spontaneously during manual contact with scar tissue. During interactions with our subjects, we felt tissues change under our fingers, and observed a ubiquitous and spontaneous re-integration and reframing of birth-related memories as emotional processing moved between body and brain. Genital awareness and sexual safety changed as subjects experienced emotional release. Subjects described their sensations during these releases as palpable and profound.

These sensations included tingling through the spine and extremities, which transformed into relaxation and pleasurable warmth moving through scarred tissues. In several cases, this warmth progressed to spontaneous painless uterine contractions and midline unwinding. In addition to proposing a potential mechanism for rapid change above, Ho adds that such changes might happen concurrently with the body/mind's continuous revision of memory:

> One never ceases to write and overwrite one's biography—it is a tissue of reconstructions. There is no sharp distinction between the here and now and what has gone before. "Past" simultaneities over-arch the "now" and extend beyond while further simultaneities are seeded within the "now." (Ho, 1997, para 30)

Our findings substantiated to our satisfaction that dramatic change in the density and viscosity of scar tissue was repeatable. We questioned what kinds of factors predisposed individuals to these rapid responses. What the rapid responders from our investigation had in common was that each of them was aware of, and could describe feeling the movement of *qi*, as warmth and life force energy, during deep palpation of their bodies.

Training in Shiatsu and pain assessment reiterates that a healthy balance between four domains of functional health are the singular requirement that allows one to consciously observe, while somatically sensing, the movement of *qi* as a distinct sensation. After our lengthy intake and holistic assessment process, it was clear who among our subjects was in a healthy state of balance within the four domains, and who still had work ahead to attain this balance. Each woman who experienced rapid and dramatic tissue change was squarely in the category of healthy domain balance.

According to Shiatsu theory, this ideal balance predisposes the individual to a state that enables, and indeed predicts, rapid changes in internalized emotional holding, postural habits, and scar tissue (Kaneko, 2010; Medici, 2013c). Using Ho's terminology, this state may be defined as *coherence*, (Ho, 1997). Mae Wan Ho suggests that quantum coherence "effectively frees the organism from thermodynamic constraints so that it is poised for rapid, specific intercommunication, enabling it to function as a coherent whole" (Ho, 1997, para 3).

Medici teaches that *only* an ideal balance between the Four Domains permits such rapid transformation. Ho supports this: "If, however, the system is coherent to begin with, then *a genuine nonlocal simultaneity may be involved*. The present precision of recording is insufficient to distinguish between instantaneous simultaneity and propagation [of change] at the speed of light" (Ho, 1997, para 22).

Another explanation for the dynamic and rapid changes we observed in the genital tissues of our subjects was suggested by the work of Robert Schleip. He suggests that myofascial manipulation works not only on the mechanical aspects of fascia, it works on the autonomic regulatory mechanisms of the nervous system itself. "[S]elf-regulatory

qualities of the client's nervous system must be included in an explanatory model of the dynamics of fascial plasticity in myofascial manipulations" (Schleip, 2003a, p. 13).

In the case of our subjects, manipulation of pelvic floor structures addressed both myofascial and smooth muscle layers. Smooth muscle tension, governed by autonomic cues, responds to both sympathetic and parasympathetic signals, and can affect sexual arousal (Berman, 2005; Guyton & Hall, 2000; Hamm, 2011). Smooth muscle is present in the uterus, cervix, and vaginal walls, and in the pelvic floor in the endopelvic fascia, perineal body, internal anal sphincter, and urethra (Barber, 2005; Raizada & Mittal, 2008). Research in osteopathy and heart rate variability links chronic smooth muscle tension to continual sympathetic overloading of neural circuits, suggesting that it negatively affects normal physiologic function (Hamm, 2011; Henley, Ivins, Mills, Wen, & Benjamin, 2008). We include women's sexual arousal as a pleasurable aspect of normal physiologic function.

Schleip submits that smooth muscle cells and mechanoreceptors, present within connective tissue, surround and permeate muscular structures throughout the body (Schleip, 2003a; 2003b; 2003c). He describes fascia as having the ability to contract in a "smooth muscle-like manner." He has published that fascia, due to its smooth muscle component, responds, like smooth muscle, to autonomic cues (Schleip, Klingler, & Lehmann-Horn, 2006). In contrast to normal autonomic pendulation between up- and down-regulation, Medici suggests that constant up-regulation from stress (non-stop sympathetic messaging) can up-regulate the tone of fascia as surely as it increases smooth muscle tone (Medici, 2012d,; 2013c,). We expected this would affect the normal trajectory of sexual arousal by blocking pathways for neural delivery of sensation cues,

and engorgement and drainage of erectile tissue beds found throughout the pelvic floor. Inhibition of engorgement leads to a lack of lubrication and makes the friction of penetration painful.

According to Schleip, wherever the smooth muscle component of fascia is being stimulated—a state of relaxation is transmitted from the point of pressure to the core of autonomic control in the center of the brain. Schleip advises using gentle, sustained pressure on fascia to communicate from the location of this local pressure back to the hypothalamus through mechanoreceptor pathways (Schleip, 2003b). Shiatsu theory indicates that a similar directional communication occurs via meridian pathways (Kaneko, 2010; Medici, 2013c). By either path, the result of gentle sustained pressure is a lowering of both local and global sympathetic tone, and a general relaxation of tissues (Hamm, 2011; Zullow & Reisman, 1997).

Once the hypothalamus has received cues from gentle pressure treatment applied to points at the periphery, additional down-regulation messages then travel outward from the hypothalamus, which have a global effect on muscle tonus, fluid dynamics, and the smooth muscle cell tension embedded within the fascia (Schleip, 2003b). Schleip suggests that continuity within this feedback loop will initiate rapid changes in fascia viscosity:

> An immediate tissue release is often felt under the working hand. This amazing feature has traditionally been attributed to mechanical properties of the connective tissue. Yet studies have shown that either much stronger forces or longer durations would be required for a permanent viscoelastic deformation of fascia. Fascia nevertheless is densely innervated by mechanoreceptors, which are

> responsive to manual pressure. Stimulation of these sensory receptors has been shown to lead to a lowering of sympathetic tonus as well as a change in local tissue viscosity. (Schleip, 2003b, abstract)

We worked both at local and global levels to accomplish a state of deep relaxation in our subjects. We worked globally with subjects' autonomic nervous system at the beginning of each session by using craniosacral techniques to relax the body prior to genital contact. We worked locally with prolonged, gentle stretching and single-point contacts into the scars themselves to effect change in the dynamic viscosity of the tissue in our subjects' pelvic floor. As smooth muscle relaxes, so does any restriction it may create on neural impulses, blood delivery, and lymphatic drainage. These changes have the potential to restore normal sexual physiology.

In addition to any autonomically induced changes to fascial viscosity that may have been brought about by our manual work with genital scar tissue, we used the foundational craniosacral technique of CV4. This technique requires that subjects lie face up on the table, with the weight of the back of the subject's head resting on the folded hands of the practitioner in a way that provides steady compressive pressure through intracranial structures into the brainstem. Steady pressure into this area is known to induce profound states of relaxation in those who are CV4 responders (Collard, 2009; Minasny, 2009; Zullow & Reisman, 1997). Based on Heed's work with Kinzbach, we anticipated that subjects who were relaxed prior to direct genital contact would be more liable to have dynamic tissue responses to hands-on work, and to have better access to memories and emotions as they emerged.

We did not consider ourselves direct manipulators of the nervous systems of our subjects. Rather, we were facilitators of relaxation, so subjects' bodies might access, reconnect with, and release patterns of autonomic distress held in their scar tissue since their own birthing experiences. While working with the dynamics of fascia, Schleip regards the role of the practitioner not as that of a tissue mechanic. "[I] t is more appropriate to assume the role of a midwife or facilitator that is skillfully assisting a self-regulatory process of the organism" (Schleip, 2003b, p. 113).

Each of these 4 women experienced one or more potent episodes of somatic recall, which immediately preceded dramatic reductions in the density and viscosity of her scar tissue. James Oschman coined the term *somatic recall*, and has stated,

> Practitioners who repeatedly have these "somatic recall" experiences with their clients begin to suspect that "memories" of traumatic or other events may be stored in or accessed by the soft tissues of the body. Sometimes the "flashback" is associated with erasure of the memory. When this happens, the emotional "charge" surrounding the memory may disappear. To the extent that our mental lives influence our physical bodies, and vice versa, any therapeutic practice that has an effect on memory can have a profound, dynamic, and multidimensional influence on every attribute of the organism. (Oschman & Oschman, 1995a, para 4–5)

The Oschmans write passionately about non-local, body-wide memory in their pair of papers about somatic recall. They also suggest that there are many types of communication between bodies, happening at multiple levels, including "electric, magnetic, thermal, photonic, microwave, and other kinds of energy" (Oschman &

Oschman, 1995b, para 53). They propose that memory is distributed throughout the body holographically, citing the work of Karl Pribram (Oschman & Oschman, 1995b).

Looking at the research of both Hameroff, and Young, the Oschmans posit that memory may be stored as an artifact of habitual body usage, including minute adaptations in cytoskeletal mechanics (Oschman & Oschman, 1995a; 1995b; Rasmussen, Karampuwala, Vaidyanath, Jensen, & Hameroff, 1990; Young & Hobbs, 1975). They submit that communication travels non-locally as cytoskeletal components "read" coherent wave fronts of information generated during soft tissue manipulation, adding that these waves are influenced by the attention and intention of the therapist.

Finally, the Oschmans propose that tissue memories may be erased as connective tissue elements, including the extracellular matrix (ECM), collagen fibers within the ECM, and microtubules within collagen fibers, break up (Oschman & Oschman, 1995a). Donald Ingber suggests that microtubules within the cytoskeleton are inextricably linked together, enhancing communication through every level of cellular structure: from the ECM straight into the DNA (Ingber, 2010). It is worth noting that Hameroff and Penrose refer to microtubules as potential independent generators of consciousness (Hameroff & Penrose, 2014).

We concluded that episodes of somatic recall have validity based on our many observations of such episodes during this investigation. Although the science to explain instantaneous tissue conformational change is still largely uninvestigated, it is our hope that others will take an interest in these phenomena and bring the spirit of open minded inquiry to further examinations of what is possible when mind and body are aligned within the four domains of health.

Two of 12 women described somatic sex education as the most valuable aspect of their experience with us. “Somatic sexual education” is a phrase found throughout the Sexological Bodywork training curriculum to describe how we use touch to teach others about sex. Sexological Bodywork trainer Joseph Kramer quotes Staci Haines, author of *Healing Sex*, who states that somatics is “an educational and transformational approach that assumes that the body, mind and emotions are one interconnected biological system” (Haines & Newman, 2007, p. 26). The embedded nature of brain within body and body within brain suggested by Mae Wan Ho, and referenced at length in this discussion, is supported here by both Haines and Kramer.

The use of touch is a way to light up and improve relational association and sensitivity between the brain and genital tissues (Kramer, 2011; Loupos, 2011). In the United States, this is distinct from clinical sexology, which uses words and ideas to facilitate sexual change, but may not by law employ direct touch. The Association of Certified Sexological Bodyworkers (ACSB) website reports that:

> Uniquely in the professions, we are trained to do genital and anal touch for education, healing and pleasure. We touch in ways that assist students in developing presence within the body, opening interior awareness, and learning how the body can feel more and more alive. (Association of Certitied Sexological Bodyworkers, 2014)

The continuity of body, brain, pain, and its relief is brought into bold focus by the work of Thomas Hanna, whose model of somatic education forms the basis for much of Sexological Bodywork theory. Joseph Kramer cites the work of Hanna as central to the concept of somatic sex education, and quotes Hanna in the coursework for Sexological

Bodyworkers: “somatic education has emerged during the twentieth century as a procedure whereby this internalized learning process is initiated by a teacher who stimulates and guides the learner through a sensory-motor process of physiological change” (Hanna, 1990, para 2).

Sensory motor amnesia (SMA), a term coined by Hanna, describes that loss of sensation is due to several pathological processes, including trauma (Hanna, 1990). In addition to trauma, we concluded that a lack of precise descriptive language contributes to SMA for many women. Subjects in our investigation reported a lack of vocabulary to accurately describe their problems with sexual arousal and/or pain sensations occurring in distinct locations in genital tissues. Borrowing from Hanna’s model, we called this genital sensory amnesia.

We sought to address genital sensory amnesia by using the genital mapping process. We supposed that lack of descriptive language could result in dissociation from genital tissues, as it is layered onto an already existing no-woman’s land of nameless mystery “down there.” For arguably good reasons, genitals have likely not been mapped the way the toes and the nose get touched, located, and named by parents during infancy. At this point in history, there is no age appropriate, culturally acceptable, and readily available model that includes the naming of all of women’s genitals as part of a normalized and legitimate process for self-definition.

We wanted to empower our subjects by addressing the deficit of language for genital and pelvic anatomy as early in our session work as possible. We felt it was important to share a common language to describe the precise position and sensations that emerged as we located scars in genital, abdominal, and perineal tissues. Subjects

demonstrated enthusiasm about this kind of somatic learning, as we mapped their genitals over the course of three research sessions to determine where and how painful scars changed over time.

We assumed that mastering an accurate language to describe sexual and pain sensations and their locations would empower subjects to gain greater agency in relation to their own genitals. Agency may be defined in this instance as one's ability to sense and locate genital tissues as part of one's internal, intrinsic map of self. In our work with subjects, we used Hanna's model of pandiculation to assist women in locating and sensing their genitals. Hanna describes pandiculation as a method for stretching and contracting muscles—in our case this included pelvic floor muscles and genital tissues. This technique is used to reconnect one's dissociated muscle or other tissue back to its representation in the brain's sensory motor cortex.

> Rather than the practitioner focusing on providing sensory feedback by his own manipulations, the learner is invited to make a strong voluntary contraction of the amnesic muscles, thus creating his own strong sensory feedback and providing a simultaneous sensory reinforcement to the motor neurons while they are continuing their voluntary contractive activity. (Hanna, 1990, para 65)

According to Hanna, a trauma reflex occurs that is capable of generating sensory motor amnesia in response to severe injury. We believe that one-way memories of trauma become sublimated is to become embedded within the collagen matrix of scar tissue. In addition to helping women locate their parts, the naming and claiming made possible during the mapping process helped subjects to locate and legitimize the felt reality of

their painful sensations. This reinforced the location and awareness of pain, not only as it arose, but also when it attenuated or disappeared.

> Our conscious, voluntary experience arises out of—and totally depends upon—our unconscious, involuntary layer of experience. At birth, we are little more than involuntary reflexes and autonomic processes. Only gradually do we learn our way into the realm of conscious, voluntary control. If, however, something occurs to evoke strong involuntary, autonomic reflexes, we can find our sensory-motor realm taken over by unconscious control against which we can do nothing directly; we can only, once again, ***learn*** our way out of this loss of volition. (Hanna, 1990, para 55)

The value of learning acquired during genital mapping was verified by 2 subjects' reports that this information was the most significant benefit of their work with us. These subjects told us the genital mapping process gave them a chance to acknowledge and re-evaluate patterns of unexamined sexual shame, which they had not expected to encounter.

After 17 years as an anatomy instructor to yoga teachers, and 10 years teaching anatomy and pain assessment in massage school, I learned that women are not aware of the names and locations of many aspects of their reproductive and genital anatomy. I assumed that shame had a large part to play in students' lack of curiosity about their own basic sexual anatomy. I routinely asked my female anatomy students if they could tell me the location of their cervix and was initially surprised by how few of them knew such basic information.

As years passed, I continued this practice, and found that each year the number of students who could correctly identify their cervix location decreased. In addition to

providing basic information about healthy genital function and location, genital mapping was placed centrally in our research protocols in order to address unconscious patterns of sexual shame. Using Almaas' concept of the "Genital Hole," Kramer suggests that, "The major physiological strategy for avoiding sexual feelings that result in shame and guilt is to place one's attention outside of the body. We actually learn to limit all types of sensations, not just excitement and bliss" (Kramer, 2009, para 3).

Two others of 12 subjects reported that their sexual pain diminished gradually over time during their course of three sessions. We surmised this was due to continual applications of castor oil in addition to manual tissue work. The way in which we used castor oil has been described in detail in Chapter 4 of this dissertation.

The mechanism explaining how castor oil may be effective for resolving pain from scars in mucosal membranes of genital and intravaginal tissues remains to be definitively described. My queries of a local pharmacologist resulted in his explanation that uptake of castor oil would be more efficient through mucosal tissues compared to skin, for example. Mucosal surfaces of the vulva are fenestrated, meaning that there are larger spaces between cells than in skin. He reasoned that because of larger openings in the vaginal and vulvar mucosae cellular structure, more castor oil would be absorbed, and its uptake would be more rapid than what is conventionally expected in topical applications (A. Weiner, personal communication, Sept 13, 2010).

It is possible that castor oil made certain biochemical and conformational changes to local cells, lymphatic, and connective tissue structures. We surmised this was due to the properties of ricinoleic acid, a well-researched active compound found in this historical healing oil. In a paper about immunomodulation and the topical use of castor

oil, Grady suggests that the uptake of castor oil is directed to the lymph rather than into the bloodstream (Grady, 1997). If this is the case, lymphatic drainage channels once blocked by scar tissue may have benefited by the rapid uptake of castor oil, which could contribute to opening these channels. If topically applied castor oil was absorbed through a fenestrated mucosal lining and distributed through local lymph channels, local analgesic and anti-inflammatory effects of ricinoleic acid might be observed.

I noticed during hands-on work with subjects that castor oil seemed to have a distinct analgesic effect. Subjects, who reported pain upon initial palpation of scars, found after 3 to 5 minutes of massage and gentle stretching of tissues, they could no longer feel these painful sensations. This appeared to be a distinct effect of castor oil that caused surprise when the attention of subjects was directed to their pain resolution, which did not include episodes of somatic recall. We were unable to determine how long this pain relief lasted, as applications of castor oil were ongoing over the course of research sessions and happened at intervals of once every 3 to 5 days.

Fear of sexual pain is understandable, yet research about psychological factors in sexual pain is scarce (Alappattu & Bishop, 2011; Desrochers, Bergeron, Khalifé, Dupuis, & Jodoin, 2009). The remaining 2 of 12 women in our critical investigation commented that seeing their sexual pain as part of a larger picture allowed them to let go of their fears about that pain. Of two studies that looked at fear of pain and avoidance of sex resulting from these fears, one study considered how avoidance and self-efficacy differed in their influence of sexual pain, finding:

> That the more women report becoming anxious, avoiding pain and having lower self-efficacy, the more they experience important sexual impairment. Furthermore,

> results show that only self-efficacy may be considered as an independent contributor to sexual functioning. (Desrochers et al., 2009, p. 525)

We encouraged sexual self-efficacy during research sessions by educating subjects about their genital locations, function, and by providing an explanation of how scar tissue could cause sexual pain. Additionally, we placed sexual pain within a larger context by educating subjects about the model of the four domains of functional health. Seeing scars as part of an interrelated web of factors that each influenced pain allowed subjects to form a direct relationship with self-efficacy.

We believe self-efficacy was supported by subjects' direct participation in home application of castor oil and self-massage, as well as noticing and making changes in pelvic floor inflammation by cutting down their sugar intake and by identifying other dietary factors that worsened inflammatory sexual pain. Together with subjects we reflected on postural habits that might have been caused by scar tissue. We suggested stretches and other interventions to improve posture, abdominal strength, and pelvic floor tone, and subjects complied. The women in our study noticed and commented on regaining strength and flexibility as they re-connected with awareness of their own abdominal power and improved alignment. These changes resulted from postural cues they received during sessions, and also from bodywork on muscle groups most affected by pregnancy and childcare.

Subjects confirmed greater self-efficacy when they told us that access to better posture gave rise to, or improved their self-confidence, as they changed the way they viewed themselves. They reported they no longer felt weak or broken. Subjects

emphasized that understanding pain, as the outcome of imbalanced relationships between the four domains of health, provided motivation to take better care of themselves.

Recommendations

The use of manual therapy to resolve painful sex due to pelvic floor and abdominal scar tissue is worthy of considerable future investigation. Scar tissue in relation to painful sex is a deep problem for many women, which has a negative effect on their relational and sexual lives. The research protocols we developed, and documented in this dissertation, have barely begun to explore what is possible in terms of alleviation of sexual pain related to the accumulation of scar tissue.

According to Fourie, Chaitow, Findley, and many others who advise researchers in the fields of manual therapy and connective tissue research, evidence of efficacy for the use of any particular manual therapy technique is notoriously difficult to quantify; especially true in the context of repeatable scientific inquiry (Chaitow, 2007; Findley, Chaudhry, Stecco, & Roman, 2012; Findley & Delisa, 1990; Fourie, 2012). Findley argues passionately for formulation of the "right questions" in manually oriented clinical research (Findley, 1989, abstract). Fourie notes that the subjective nature governing one's receipt of touch, along with the specific technical language used by each school of manual therapy creates problems of validation, reliability and repeatability for would-be researchers (Fourie, 2012).

In order to make evidence-based research about hands-on techniques more accessible across a variety of manual therapy disciplines, Fourie has written a brief but practical guide suggesting a methodology to standardize use of language across all manual therapy studies (Fourie, 2012). Recognition of Fourie's suggested standards and

their application would be beneficial for future research into scar tissue, by (at least) providing a detailed description of scar location, technique of approach and the amount of pressure used, as well as the specific tissue, organ, vessel, or gland targeted for improvement. By using well-described manual techniques for the resolution of genital scar tissue and intra-pelvic adhesions, Fourie's suggestion, that use of a common language to better describe, direct, and measure the efficacy of future research, has merit.

This research was a preliminary investigation, the purpose of which was to determine whether immediate and dramatic tissue change, concomitant with the mindful palpation of genital scar tissue, was a repeatable phenomenon. Because this was a preliminary exploration of sensitive and highly personal territory, the design of our critical investigation did not include the use of standard sexual or psychological research instrumentation. Future research might seek to duplicate our investigation with the addition of such instruments, including but not limited to these validated instruments: Sexual Function Questionnaire (Quirk et al., 2002), Female Sexual Function Index (DeRogatis, 2008; Meston & Derogatis, 2002; Rosen, 2000; Ter Kuile, Brauer, & Laan, 2006; Wiegel, Meston, & Rosen, 2005), the Female Sexual Distress Scale (Ter Kuile et al., 2006), and the Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire, also known as the PISQ-12 (Rogers, Coates, Kammerer-Doak, Khalsa, & Qualls, 2003).

Use of recognized, reliable, and valid instrumentation would aid in quantification of the effects of scar tissue on women's sexual function and give added importance to any studies that pursue the use of hands-on work for its potential to alleviate painful sex after childbirth, as we found to be the case. This would set the stage for quantitative medical research, required by 21st-century standards to be evidence-based within tight

and specific parameters. Research of this kind has the potential to normalize the wider use of manual remediation for scars acquired during childbirth. This could lead to the recognition of manual therapy for pelvic floor scar tissue as a natural part of the insured standard of care for all women during the vulnerable postpartum period, during which women in this country are typically underserved.

Future research to move forward toward effective and available care for all women who suffer sexual pain due to the accumulation of scar tissue will be evidence-based. To this end, consideration of current research that uses real-time sonoelastography is useful. This technology makes it possible to visualize how manual techniques create changes in the elasticity of scar tissue, and, according to Rodríguez and del Río, provides a convincing aid for the measurement of these valuable changes (Rodríguez & del Río, 2013). Scar tissue remediation studies that use this technology have been cited repeatedly throughout this dissertation (Comesaña et al., 2017; Rodríguez & del Río, 2013). Here is an example of the experience of one onlooker at a sonoelastography presentation by Rodríguez at the Third International Fascial Research Conference:

> Raul Rodriques [sic] PT DO, played a video of him[self] treating a bullfighter with a nasty scar through the thigh. The audience gasped as they watched, for the first time, layers of cross-linked fibrous connective tissue give way as Dr. Rodriques' [sic] trained hands manipulated the adhesive layers allowing them to once again glide on one another. Through real-time sonoelastography imaging, Rodriques [sic] was able to demonstrate and explain the process of scar remodeling and how it can be effectively used to guide treatments. Although many clinicians in the audience had experienced the sensation of restoring local

elasticity to injured tissue, seeing the process in real-time was spellbinding. (Dalton, 2017, para 2)

Expanded use of sonoelastography will add measureable visual evidence to future research on scar tissue. This will aid in quantifying the effects of manual therapy on the relief of pain due to scars, regardless of the approach used. This technology, as it evolves, will demonstrate that the particular hands-on technique used for treating scars is less important than the actual changes observed in tissue tone and elasticity.

Future research that is evidence-based and results-focused is critical. While it is common for competing schools of bodywork to compare results and perhaps expend unnecessary energy attempting to prove which school gets the best results, the true needs of the patient or client may get lost in this process. Changes in scar tissue can be made possible by any effective manual technique, when accurately visualized by appropriate technology. Understanding this point has the potential to undercut territorial positioning between competing schools of manual therapy. This will happen by placing the emphasis where it ultimately belongs: on the observable results of such techniques.

The implications of the work developed and reported by this dissertation are far reaching. Scar tissue remediation work represents a significant expansion of the breadth of issues addressed by Sexological Bodyworkers. By creating and eventually promoting a therapeutic intention for the application for Sexological Bodywork, many more people can be reached and helped by this new profession. Scar tissue remediation is building a bridge between Sexological Bodywork for those who are ready to explore the leading edge of somatic sexual experience and those who are only just becoming aware that this work can be an effective modality to address sexual pain—before addressing their

sexuality as a whole. The work described in this dissertation redefines Sexological Bodywork as capable of helping to integrate the childbirth experience for each woman who seeks it out, at an experiential as well as emotional level. This integration includes relational sexuality, the cognitive and somatic maternal birth experience, and each woman's personal relationship with her own genitals, unhampered by sexual pain from scar tissue.

Before the addition of scar tissue remediation as one of its offerings, Sexological Bodywork sought to close the gaps of sexual self-awareness described by Kramer using Almaas' model of the Genital Hole (Almaas, 1998; 2000; Kramer, 2009). This process was accomplished through providing hands-on somatic education using the tools of breath and touch. While Sexological Bodywork, as it was practiced up to the introduction of scar tissue remediation, was certainly valuable, the use of breath and touch as it had been practiced did not recognize scar tissue as a distinct physiological cause of somatic dissociation.

During our investigation, systematic genital mapping was added to the use of breath and touch, as somatic education about sexuality. As is true for many women, the volunteers for our research were not aware of their complete sexual anatomy or the erotic function of each of their parts. For our research participants, accurate identification of genitals along with descriptions of their physiology was enlightening and acknowledged as a highlight of our work together.

Additionally, our research included active listening to the birth story of each woman who suffered trauma, both physical and emotional, during her birthing process. This was important, as it highlighted the differences between each woman's cognitive

story, taken before beginning hands-on work, and the somatic story revealed by her body during mindful palpation. This was a deeper level of mapping, beyond the naming of genital location and function. This deeper mapping included the emotional body, which allowed participants to acknowledge its importance by recognizing that the emotional body has its own story. We noticed that allowing space for this body to express its version of the birth experience was a critical part of the spontaneous and dramatic changes we observed in scar tissue.

Introduction to the model of the Four Domains of functional health as a perceptual tool will prove useful for Sexological Bodyworkers. The model allows for improved practitioner accuracy by providing a thorough device for professional assessment. The use of the Four Domains model allows scar tissue to be correctly identified as the problem, by providing a means to evaluate scar tissue as a primary causative variable. It also demands comparison to other stressors, which include the postural, emotional, and biochemical imbalances within each individual.

Scar tissue remediation provides practitioners with an opportunity to explore the scar as an essential cause of numbness and lack of connection between genital tissues and the brain's sensory motor cortex. When session focus is specifically directed to the identification of scars—first by locating and them, then by making palpable changes in the texture, size, and sensation (or lack thereof) of these scars in genital, abdominal, and pelvic floor tissues, chances of a meaningful and lasting shift in the sexual experience of the receiver are increased. Use of the model of four essential domains of health provides Sexological Bodyworkers with a broader field for inquiry and has the potential to up-level the quality of each practitioner's ability to serve their clients.

There were many elements used in the protocol we developed to address scar tissue during this critical investigation. Other studies could be done, which include comparison studies that look at the application of manual scar tissue remediation techniques alone, without the addition of the other elements utilized in our protocols. Each element of our protocol could be isolated and compared in order to ascertain which of those are absolutely required to produce positive and repeatable results.

Elements that might be compared include active listening to each woman's birth story, including the story of the emotional body, genital mapping for purposes of somatic sexual education and scar location, sexual health education framing scar tissue as one of four essential domains of health, the use of craniosacral techniques for autonomic down-regulation at the beginning of each session, and both active and passive scar tissue remediation work that each woman in our investigation used at home on her own. The rationale for each of these elements is described in both the Methods and Literature Review chapters of this dissertation. Future researchers may have an interest in evaluating each element individually as adjuncts to manual scar tissue remediation techniques, in order to determine the relative efficacy of each one.

In conclusion, there are likely to be many alternative techniques, therapies, and perspectives that will provide relief for the thousands of women who report painful sex after childbirth, not to mention pain from scar tissue caused by other conditions. The routine provision of care for the problem of postpartum scar tissue is available in other countries, most notably France. According to a National Public Radio report, home visits complete with pelvic floor exams and physical therapy are a routine part of postpartum care for many women in that country (Shapiro, 2008). Women continue to suffer

needlessly in the United States. As scar tissue inevitably becomes recognized for its contribution to sexual pain, many new therapeutic modalities to treat this pernicious problem will arise. Hands-on, hands-in work will be one of them, improving the sexual and relational lives of women everywhere.

We developed this information as an online self-help program to assist women with treating their own scar tissue in a home setting. This information has developed still further by becoming embedded as an intrinsic part of the Sexological Bodywork curriculum in Australia, Canada, the UK, and the US. Scar Tissue Remediation, Education, and Management (STREAM) has evolved yet further, as a stand-alone training for somatic professionals who have scope of practice for hands-on treatment of pelvic pain.

Kimberly Johnson, our first research participant, became a collaborating teacher and co-taught several scar tissue remediation trainings with the author. Below, a larger hermeneutic spiral depicts the evolution of our ideas into a global training and treatment program that reaches many hundreds of women in 10 countries. The case history mind maps illustrated in this dissertation have become valuable in teaching this work to students and are now a part of the curriculum for scar tissue remediation trainings taught throughout English speaking countries.

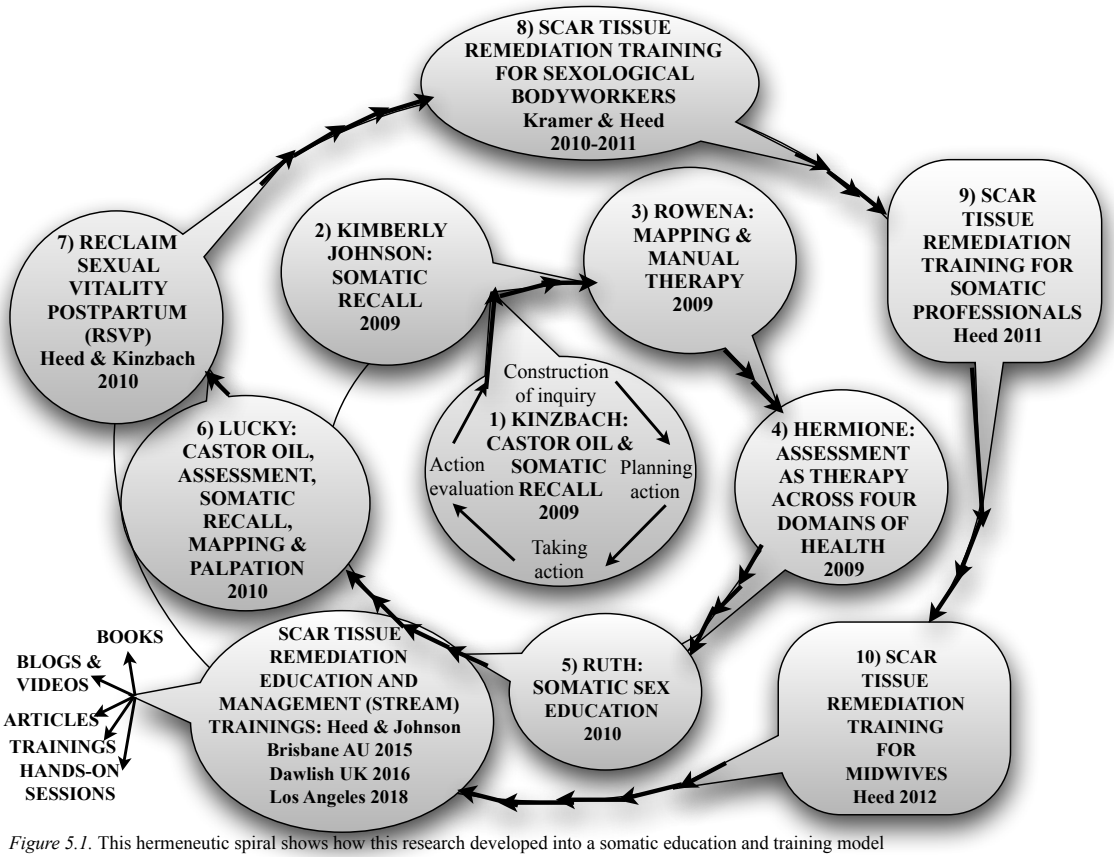


Figure 5.1. This hermeneutic spiral shows how this research developed into a somatic education and training model for scar tissue remediation, education, and management.

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APPENDIXES

APPENDIX A

SEXOLOGICAL BODYWORK CODE OF ETHICS

Sexological Bodywork Code of Ethics

Retrieved from: http://sexologicalbodyworkers.org/ethics/

Duties and Obligations Towards Our Students:

1. CSBs will be professional in attitude and conduct, responsible in relations with clients and students, reliable in agreements and timely in appointment schedules.

2. CSBs will introduce prospective students to the techniques of somatic sex education, including the use of touch so potential students can make informed decisions about entering into educational sessions. CSBs agree to maintain appropriate documentation of consent.

3. CSBs recognize the importance of consent and choice in all somatic sex education with groups and individuals. CSBs will strive to provide a range of options from which the student can actively elect that which will serve their own education. At

no time shall a student be required or coerced to participate in any activity, event or exercise. CSBs include education about consent and choice and actively create learning environments where students are empowered to exercise these skills.

4. CSBs may use physical touch in an educational context. If they do so, they touch consciously and with the attitude to do no harm. CSBs agree to obtain students' consent and to act with concern for their safety, growth, and awareness of boundaries.

5. Regarding Sexual Contact and/or Conduct with Students a. We acknowledge the importance of maintaining appropriate boundaries, including asking permission to touch and stopping touch when our students request it. We are conscious and make our students conscious that while we share authentic intimacy, Sexological Bodywork sessions will neither fulfill CSBs, nor their students desire for sexual connection. In group or individual sessions we remain clothed when touching our students and touching is unidirectional. We request that our students bring their partners when they wish to learn interpersonal erotic skills or invite them to share and learn with other students when appropriate. CSBs understand the inherent power we hold in our role of teacher and will not use this power for sexual exploitation of our students.

6. CSBs acknowledge the importance of physical, emotional and spiritual well being. To protect the health of both student and professional, CSBs recognize the

need for risk-reduction and professional protocol in all individual and group somatic sex education. CSBs take steps to minimize any physical or emotional harm, in active collaboration with all students. Professional protocol includes the use of medical-grade examination gloves and quality water-based lubricants. All group classes shall include education about group hygeine protocol, with sufficient facilities/supplies provided to students to maintain appropriate hygiene.

7. CSBs will refrain from providing bodywork, training sessions and/or presenting any instructional material while either the Sexological Bodyworker or the client/student is under the influence of alcohol or illegal drugs.

8. A CSB will consider the limits of their skills and experience before accepting requests for or providing educational or instructional services to potential students. Further, a CSB will refuse professional work for which they are insufficiently prepared.

9. CSBs will seek the advice of colleagues or supervisors as a routine part of their practice or training. In consultations, confidential information that reasonably could lead to the identification of the student is not shared without prior written consent of the student.

10. CSBs will terminate professional services to and relationships with students when such services are no longer required or no longer serve the needs and interests of the students.

11. CSBs may unilaterally terminate services, on just and reasonable grounds after careful consideration of all situational factors and any possible adverse effects. CSBs are responsible to make appropriate referrals and to provide support to students during this transition.

12. CSBs will refrain from the exploitation of professional relationships with our students for personal gain, whether financial, professional, or for research purposes. CSBs will be professional in attitude and conduct, responsible in relations with clients and students, reliable in agreements and timely in appointment schedules.

13. CSBs will introduce prospective students to the techniques of somatic sex education, including the use of touch so potential students can make informed decisions about entering into educational sessions. CSBs agree to maintain appropriate documentation of consent.

14. CSBs recognize the importance of consent and choice in all somatic sex education with groups and individuals. CSBs will strive to provide a range of options from which the student can actively elect that which will serve their own education. At

no time shall a student be required or coerced to participate in any activity, event or exercise. CSBs include education about consent and choice and actively create learning environments where students are empowered to exercise these skills.

15. CSBs may use physical touch in an educational context. If they do so, they touch consciously and with the attitude to do no harm. CSBs agree to obtain students' consent and to act with concern for their safety, growth, and awareness of boundaries.

16. Regarding Sexual Contact and/or Conduct with Students a. We acknowledge the importance of maintaining appropriate boundaries, including asking permission to touch and stopping touch when our students request it. We are conscious and make our students conscious that while we share authentic intimacy, Sexological Bodywork sessions will neither fulfill CSBs, nor their students desire for sexual connection. In group or individual sessions we remain clothed when touching our students and touching is unidirectional. We request that our students bring their partners when they wish to learn interpersonal erotic skills or invite them to share and learn with other students when appropriate. CSBs understand the inherent power we hold in our role of teacher and will not use this power for sexual exploitation of our students.

APPENDIX B

VULVA AND GENITAL MAPPING SCRIPTS

Bony Landmarks

Genital massage strokes:

Demo: during the whole exploration - the demo model stays on the table.

Ellen demonstrates on the model for first section.

The class follows along during a second demo.

Experiential anatomy studies:

Mapping of the parts: include palpation and naming of organs, glands, bony structures, soft tissues, orifices, and engorge-able parts, include anal sphincters if there is time.

Note what feels good and where your mapping partner would like to revisit at a later session.

Start here: Bony landmarks

Palpation & exploration: Hands are gloved and DRY

The receiver is lying face up on the massage table.

Anterior superior iliac spines

Anterior spines of pelvis: Hands drape over the bones & hold

Ovarian warming

Rub palms together until warm and hold over ovaries

Pubic symphesis

Heel of hand to pubic bone, hand drapes over vuvla & hold

Vibrate the mons, rock hand over mons, move the mons in circles

Rock your hand so your middle finger contacts perineum, palpate perineum

Perineum

Doorbell on the perineum

Move lateral to find the sit bones (ischial tuberosities)

Ischial tuberosities

Cup one hand around ischial tuberosity

Hold both ischial tuberosities together

Gently rock her from her sit bones

Superior pubic ramus & inguinal region

Pressure into acupoints up the inguinal region

Pressure straight in, cutting, & rotations on the points –

Find out what feels the best

Soft Tissues

Soft tissues: external vulva palpation

Outer lips of vulva

Roll & tug on the outer lips, gently pull on the hair (if any)

Pull outer lips straight down, then pull straight out

Inner lips of vulva

Roll & tug on the inner lips

See how much tugging is pleasurable to your partner

Some women like lots of hard tugging

Some women prefer only a gentle pull

Pull inner lips apart to reveal:

The vestibule, the clitoris, clitoral hood, urethra & introitus

Apply oil:

The clitoris

Find the glans, the hood, the shaft, the clitoral legs

Pull back the hood to reveal the glans

Tap on the glans, stroke the glans, try the classic One Taste 2:30 stroke for several minutes – imagine 15 minutes of this every day, several times a day!

Roll the shaft back & forth, all the way up to the pubic bone. Feel deep along the sides of the inferior pubic rami; locating the legs of the clit, Can you feel them? Roll them back on forth under the skin between the outer & inner lips.

NOTICE if while the clitoris is stimulated, arousal starts to build.

The vestibular bulbs

The vestibular bulbs may start to engorge during clitoral stimulation. The receiver may feel pulsation, or a feeling of heaviness just deep to her inner lips, deep to the vestibule.

This is the home of the vestibular bulbs. Notice her introitus, is it getting narrower?

This is the beginning of a “hard around”.

Press into the tissue under her vestibule.

Roll the membrane of the vestibule back and forth over her vestibular bulbs.

Is this pleasurable?

The perineal sponge

The perineal sponge lies just at the posterior end (6:00 position) of her introitus. It is an engorge-able tissue that squeezes the introitus tight when it is full of blood, along with the vestibular bulbs & G-spot crest.

Push down into the bottom of the introitus, into the perineal sponge.

Pulse your finger or thumb. How does this feel?

If engorgement is present, it may feel surprisingly good!

Rest your finger or thumb into the perineal sponge, feeling for the slight pulsation of blood as it fills this area so rich in specialized engorgement capillaries.

Internal Work

Internal vaginal palpation and mapping

Vaginal mapping: intriotis

Locate and name the cardinal points around the introitis.

Ask for feedback about sensitive spots, and pleasurable spots.

Note any places where the tissue seems thin.

Note any places where there is a change in tissue continuity.

These might be useful places for scar tissue work later.

Vaginal mapping: going deeper

Allow the recipient to lead and request palpation and contact inside their vagina.

Follow their lead, and experiment with holding any tight or tender places until you notice a change in tissue quality. Discuss what changed with your mapping partner.

Find and map the location of their cervix.

The G-spot or G-spot or G-crest

The G-spot crest is located along the top of the vaginal canal. It is an area of glandular tissue that is engorged by prostatic fluid. It is located at 12:00 just inside of the introitus.

It may have a ridged feeling to your finger, which gets more pronounced as arousal increases. Gently insert one finger, pad of the finger faces straight up.

Using the pad of your finger, stroke along the G-crest from deep inside the vaginal canal toward the entrance of their intriotus.

Vary the speed and pressure.

If your partner wants to learn to ejaculate, you may need to work with this area repeatedly over time. They may report feeling a need to urinate. The feeling of "needing to pee" may change from uncomfortable to pleasurable, to exquisitely pleasurable. If there is any feeling of tight tissue, like stoking along a tight hairnet, or a feeling of corduroy, or numbness in this area it may indicate that scar tissue is present. Massage with castor oil may help to re-ignite pleasurable feeling in this sensitive tissue. You can continue to work with this tissue, combining the touch here with clitoral touch to connect and alternate feelings of pleasure and educate the nerves into a new state of awareness and sensitivity. This may take several months or even more than a year. Many people with scar tissue at their G-spot or G-crest have learned to desensitize themselves to sensation here due to penetration before adequate arousal and lubrication were present. It can take time and patience to re-introduce pleasure into the G-Crest.

To finish:

Hold your hand once again over the mons. Let it rest there, as your other hand contacts her heart, Breathe together as her arousal relaxes. Be here for at least 10 breaths. Stay connected and present. Questions & feedback for this exchange:

Did the receiver feel their parts?

How did they change with arousal (or not)

Interactive feedback – evaluation of quality of touch:

How present was the giver?

How was the pressure?

Speed? Anatomical accuracy?

Introduction to Penis and Anal Mapping

Male Genital Massage Strokes:

Demo: during the whole exploration - the demo model stays on the table, Ellen demo's on the model as the class follows along.

Experiential anatomy studies:

Mapping of the parts: include palpation of organs, bony structures, soft tissues, orifices, and engorge-able parts, include anal mapping & sphincters.

Chester Maynard quote:

"If I only had 5 minutes to give anyone a massage, I would work on the anus."

The prostate has little feeing for many men, except during arousal. Ellen will do a prostate exploration & ask the class to notice what changes and/or engorges with massage. Notice autonomic state change w/ smooth muscle contact.

Palpate the coccyx, also demo testicular cancer check, testicles are innervated by a different nerve than the penis - note what feels good: connection between nipples genitals…? Where you would like to revisit this at a subsequent session?

Strokes in three-piece segments

Can the receiver feel the parts?

How might they change with arousal (or not)

Interactive feedback – evaluation of quality of touch:

How present is the giver? Pressure? Speed? Anatomical accuracy?

Penis and Genital Mapping: Bony Landmarks

START HERE: No gloves yet, hands are dry. Bony landmarks of the pelvis

Sacrum & Coccyx: Sit at the side of the table, facing the table, even with receiver's waist or hips. Bottom hand transverse contact to sacrum, thumb onto coccyx.

Anterior superior iliac spines

Top arm spans between ASIS bones, with inner arm resting just outside of ASIS, fingers on the opposite ASIS pulling both anterior spines slightly medial. Feel for movement of sacrum, coccyx, and anterior spines of coxal bones.

Sacrum and pubic symphesis

Sit between the legs of you partner. Scoop on hand under the sacrum. Hold the bone in your bottom hand, while holding the pubic bone with your top hand

Ischial tuberosities

Scoop both hands under the buttocks to hold the sit-bones. Feel for any movement that may be present.

Inguinal region and superior pubic ramus

Press acupoints up the inguinal region; checking for scars from any hernia operations, ask if your partner has a hernia.

Penis and Genital Mapping: Soft Tissues

Put on gloves, gloves are dry.

Testicles, epididymis, scrotum: Hold your partner's testicles. Feel for the EPIDIDYMIS, and move the scrotum around the testicles, checking of adhesions or irregularities around their smooth surface. This is a check for testicular cancer.

Perineum: Press one or both thumbs into the perineum. Feel for the "million dollar point", where applying strong finger pressure can stop ejaculation. Ask if your partner has ever experienced this and his feelings about it. Stroke and vibrate your partner's perineum, ask if this is pleasurable.

Bulbospongiosus: Feel the contours of the deep bulbospongiousus muscle, located behind the testicles and in front of the perineum. Stroke and move the skin on both sides of the muscle. Follow the bulbospongiosus up between the testicles and up the shaft of the penis.

Frenulum: Locate the frenulum, in the midline of the underside of the penis. If your partner is circumcised, notice if there are any remnants of foreskin near the frenulum. These may be very sensitive to touch. Ask your partner if he has any particular sensitivity in this area. Stroke the skin across the frenulum. If your partner is uncircumcised, ask

about his sensation. Pull his foreskin back. This area is also known as the Gates of Consciousness.

Corona & sulcus: Feel around the edge of his corona, and the underside of his sulcus. Stay in feeling-touch with your partner. Notice if his arousal ia increasing.

Apply oil to your gloved hands.

Head of penis & urethra: Apply oil to the head of his penis and stroke it. You can vary speed, pressure, and amount of oil. Find out what feels best to him.

Gates of consciousness meditation: Stroke back & forth across his Gates of Consciousness for 10 minutes or more. Stay present to the sensation, both in your hands and in his penis. Vary speed, pressure, and amount of oil. Rest with your hand covering his penis for 2 or 3 minutes at the end of this sensate meditation to stay connected.

External and Internal Anal Mapping

Anal mapping:

Rosebud massage. Re-apply plenty of oil to you gloved fingers.

Rest your hand in your partner's gluteal cleft. Find his rosebud, and stroke around it, continuing to apply oil.

External anal sphincter: Gently explore your partner's external anal sphincter.

Wait until you are invited in. Feel for the cardinal points on the clock face.

The space between: Notice the space between the external anal sphincter and the internal anal sphincter. Feel the cardinal points again.

Internal anal sphincter: Wait until you are drawn deeper inside to feel the calamari ring of the internal anal sphincter. Explore the cardinal points and find any tight places that might like a patient and attentive finger to mirror them. Notice if there is any unwinding, spiraling movements in the internal anal sphincter, and also notice any state changes that occur.

Coccygeus, internal approach: As you go deeper past the internal anal sphincter, feel for a mass of muscle tissue that lies just underneath the coccyx. This may be a bunched up coccygeus muscle. See if you can smooth it out, and allow it to relax.

Coccyx, internal approach: Feel above the bunched thickness of muscle up to the coccyx bone.

It will feel quite hard to your fingers. Press into the anterior surface of the bone and feel the attachments of the coccygeus muscle on either side of the coccyx. Does the bone want to pull to the right or to the left? You can move the coccyx by putting a finger both internal and external, and wiggling the bone like a loose tooth. If you pat close attention to the movement of the coccyx, you may notice it move back to the midline on its own.

Sacrum, internal approach: Keep feeing up above the coccyx to the sacred bone. This will feel wider and possible harder than the coccyx. Feel for the outside margins of the sacrum.

Piriformis, internal approach: Feel for the attachments of the piriformis muscle on the outside edges of the sacrum. You can strum across over the anterior margins of the piriformis and feel the movement of the muscle. Does the muscle want to move in any particular way as you make contact with it?

Prostate gland: Turn your finger around or change fingers so you are comfortable.

The pad of your finger will point toward the ceiling, or toward you partner's navel. Insert your finger face up until you feel a walnut sized body a little deeper than one or two knuckles deep. Feel the contours of the prostate gland. You may feel a distinctive pulsation under you fingertip. You may be able to feel two distinct lobes of the prostate, with a sulcus in between. Stroke the prostate towards the sulcus. This is the motion used to milk the prostate. Your partner may

express a few drops of prostate fluid during this process. Check in with your partner during this prostate massage. Find out if he is feeling any pleasure during this prostate massage.

APPENDIX C

OUTREACH TO POTENTIAL OUTREACH PARTICIPANTS

Primary Outreach to Potential Research Participants

Facebook post and emailed to colleagues in the bodywork and yoga communities:

In my capacity and scope of practice as a Sexological Bodyworker, I am conducting a research project about the effects of pelvic floor work on women who have experienced birth-related injuries and pelvic floor trauma. I have had promising results addressing scar tissue in several women's pelvic floors damaged by childbirth. I am eager to find out whether these research protocols are effective for a wider variety of women.

I am looking for women who have torn their pelvic floor giving birth, have had episiotomies, or painful intercourse as a result of giving birth. Other pelvic floor trauma will be considered, but I am focusing primarily on post-partum sexuality and the effects of childbirth on women's sexual expression.

I am planning to work with each research participant for a minimum of three sessions, for free, in exchange for permission to use my findings and their story in the collection of

research data. Complete anonymity is guaranteed for all who choose to join me in this endeavor.

I am looking for good candidates to investigate my protocols. I will do an initial phone interview with each referral, and depending on the outcome of the initial phone interview, will conduct a 3-to 4-hour free assessment session to determine how best to address any presenting problems. Provided I feel I can help, I will offer a minimum of two additional therapeutic Sexological Bodywork sessions to work directly with any pain or scar tissue in the pelvic floor.

Anyone you think might benefit form this work would be a welcome addition to my research. Interested referrals can reach me by email or phone, though email is best.

Thanks in advance for your interest, participation, and/or referrals!

Sincerely,

Ellen Heed

Second Outreach and Scheduling for Research Subjects

I'm doing this research because I have had some remarkable results with working on scar tissue in postpartum women who have torn their vaginal floor and/or perineum while giving birth. In one case I observed what looked complete healing in the pelvic floor of a woman who sustained a 2nd degree tear that left her with a raised purple keloid scar on her vaginal floor, a disfigured vaginal opening, painful intercourse, and acute disappointment in her condition after a natural childbirth where she "did everything right."

After three sessions her scar had completely disappeared, and her sex drive and vaginal opening were back to pre-birth conditions. I am eager to find out how many women might have this experience, and so am undertaking an informal study to determine the outcome of using this research protocol with a wider variety of women.

I plan to divide the research groups into approximately 3-week sections, and will be offering one 3-to 4-hour intake session, including a hands-on pelvic exam, followed by two pelvic floor sessions. Research subjects will receive this work free of charge in exchange for permission to use any information gathered in an upcoming research paper I am writing with a research collaborator. The identity of all participants will be kept strictly confidential.

Here are the dates of the groups:

Group 1: Is full.

Group 2: Nov 14th, 21, 28

Group 3: Dec 12, 19, 29

Group 4: Jan 2, 9, 16

Group 5: Jan 23, 30, Feb 6

Group 6: Feb 13, 20, 27

Let me know when you would like to participate and we'll get you scheduled.

Thanks,

Ellen

APPENDIX D

FOUR DOMAINS INTAKE FORMS

Four Domains Intake Forms Biochemistry

www.ellenheed.com eheed@ca.rr.com

My Biochemical Profile - Intake Form

The Food Part

Your Name: _____ **Date:** _____

I eat _____% organic food, which means I eat _____% non-organic food

I eat _____% processed food (pre-made frozen, boxed, or canned)

I eat _____% food made from fresh ingredients prepared from scratch

I eat _____% of my meals at restaurants, take-out, or on the go

I eat _____% of my meals at home, sitting quietly

I eat _____% fast food, which means I eat _____% slow food

I eat _____% raw food, which means I eat _____% cooked food

I eat mostly:

___Vegetarian

___Vegan

___Omnivorous

___Primal

___Gourmet Foodie

I would like to make the following changes in my diet:

_____

_____

_____

_____

_____

_____

Four Domains Intake Forms: Biochemistry

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My Biochemical Profile - Intake Form

The Drug Part

Your Name: _____ **Date:** _____

	How Much:	How Often:
I use artificial sweeteners and/or MSG		
I self-stimulate with coffee		
I self-stimulate with caffeine		
I self-sedate with alcohol		
I self-amuse with recreational drugs		

What kind of drugs?

1) _____ 2) _____ 3) _____

I control my fertility with hormones: _____

I manage my moods with antidepressants and/or antianxiety drugs:

What kind?

1) _____ 2) _____

3) _____ 4) _____

I take other medications:

What kind?

1) _____ 2) _____

3) _____ 4) _____

Four Domains Intake Forms: Biochemistry

www.ellenheed.com eheed@ca.rr.com

My Biochemical Profile - Intake Form

The Environmental Part

Your Name: _____ **Date:** _____

I am exposed to these environmental toxins:	What kind	How often	For How long
Solvents			
Adhesives			
Synthetic fabrics			
Underwire bras			
Hair dyes			
Inks			
Auto exhaust			
Pesticides			
Herbicides			
PVC's			

I am exposed to EMF:	How close	How much	For how long
At my computer			
In front of my TV			
On my cell phone			
On my IPOD			
On my walkman			

Around my bed I have:	How close	Used how many hours per day
A clock radio		
Light fixtures		
Conducting electrical outlets		
Electric blankets		
Heating pads		
Vibrator(s)		
Other electrical devices		

I have_____# of silver amalgam fillings.

I wear a piercing in my midline _____yes_____ no For how long?_____

Four Domains Intake Forms: Biomechanics

www.ellenheed.com eheed@ca.rr.com

My Biomechanical Profile - Intake Form

The Joint Part

Your Name: _____ **Date:** _____

My most problematic joints are: Rate from most problematic (10) to least problematic (1)

Toes _____ Ankles _____ Neck _____

Lower back _____ Upper back _____ Jaw _____

Hips _____ Shoulders _____

Knees _____ Wrists _____

My most problematic muscles are: Rate from worst (10) to best (1)

	Tight	Weak	Holding Emotion
Adductors			
Piriformis			
Quads & TFL			
Psoas			
Erecters			
Diaphragm			
Pectoralis Minor			
Rhomboids			
Scalenes			
Masseter & Pterigoids			
Abs			
Quadratus lumborum			

I have these postural issues:

Kyphosis _____

Anterior Head Carriage _____

Hyperlordosis _____

Hyperextended Knees _____

Flat Lower Back _____

Scoliosis _____

Flat Feet _____

Four Domains Intake Forms: Scar Tissue

www.ellenheed.com eheed@ca.rr.com

My Scar Tissue and Injury Profile - Intake Form

Your Name: _____ **Date:** _____

Current Injuries:	For How Long?	How Severe? (1-5)
1)		
describe:		
2)		
describe:		
3)		
describe:		

Past Injuries:	What Age?	How Long?	How Severe? (1-5)
1)			
describe:			
2)			
describe:			
3)			
descibe:			
4)			
describe:			
5) Head Trauma			
describe:			

Past Surgeries:	What Age?
1)	
complications:	
2)	
complications:	
3)	
complications:	

Four Domains Intake Forms: Scar Tissue

Women's Post Partum Sexuality Intake Form

Lower Dan Tien Function:

Your Name:_____Date:_____

Urinary Tract Function: describe any problems (UTI's, burning, frequency, urgency, interstitial cystitis, etc)
Before birth:

After Birth:

Bowel Function: describe your bowel habits (how often is "regular" for you?, constipation, IBS, Crohn's disease, irregular colonoscopy, or other bowel problems)
Before birth:

After birth:

Describe your menstrual cycle and any problems (typical length of you cycle, cramps, clotting, endometriosis, missed periods, etc.)
Before birth:

After birth:

Have you had any abortions?_____ How many?_____ Any complications? Describe:

Four Domains Intake Forms: Emotion

www.ellenheed.com eheed@ca.rr.com

My Emotional Profile - Intake Form

The Contibuting Factor Part

Your Name: _____ **Date:** _____

I have experienced:	Age___ to___	Describe
_____ Physical abuse		
_____ Emotional abuse		
_____ Neglect		
_____ Sexual abuse		
_____ Death of a loved-one		
_____ Traumatic Injuries		
_____ My parent's divorce		
_____ My divorce		
_____ Other		

My Emotional Profile

The Causative Factor Part

I suffer from:	Daily	Weekly	Monthly	How intensely? (1-5)
Stress				
Anxiety				
Depression				
Eating Disorders				
describe:				
Sleep Disorders				
describe:				
Low self-esteem				
describe:				
Low sexual desire				
Chronic pain				
describe:				
Other				
describe:				

Four Domains Intake Forms: Emotion & Scar Tissue

Women's Post Partum Sexuality Intake Form

Birth Story Profile

Your Name_____ Date_____

Date of this Birth_____ Type of birth (Hospital, Home, Water, Orgasmic, etc)_____

Duration of Labor_____ Type of Delivery (Vaginal, C-Section, VBAC)_____

Interventions during labor? (Induction, epidural, fetal monitors, etc)_____

_____

Interventions during delivery? (forceps, vacuum extraction)_____

_____

Episiotomy? (median or medio-lateral, describe any problems during healing)_____

_____

_____

_____

Perineal tears or other pelvic floor trauma? (Skid-marks, 1st, 2nd, 3rd, 4th degree tears etc) describe any problems during healing_____

_____

_____

_____

Describe any pain or difficulty with intercourse (pinchy, painful, dry, etc) or urination (frequent, urgent, etc) Post-partum_____

_____

_____

_____

_____

Please tell your birth story on the reverse side:_____

_____

Four Domains Intake Forms: Emotion

Women's Post Partum Sexuality Intake Form

Body Image & Self Esteem

Your Name:_____Date:_____

Briefly describe your level of self esteem as regards body image before pregnancy. (what are your personal gremlins? How did you deal with them? Did you like your body? Have you altered your body?: piercings, tattoos, surgeries, etc)

Describe your level of self esteem after pregnancy, what changed?

What would a healthy body image feel like? Would you like to improve your level of self esteem now? What would it take for you to feel wonderfully self confident? Would increasing your sexual confidence help?

Four Domains Intake Forms: Emotion

Women's Post Partum Sexuality Intake Form

Sexual History & Goals

Your Name:_____Date:_____

Briefly describe your sexual history before you gave birth: (Did you enjoy sex? How often? Any sexual trauma: date-rape, abusive relationship, unwanted sexual advances, sexual violence, sexual frustration?)

Describe your sexual experience after birth:

What are your sexual goals for the future?

APPENDIX E

RESEARCH SUBJECT SUMMARIES

Kimberly

Name / Date Profession / CT type Intake, Inquiries, Actions, Outcomes	1st Session 10/10/09	2nd Session 10/13/09	3rd Session 10/22/09	NOTES on what changed
Kimberly 10/10/90-10/22/09 Rolfer, Yoga instr., Doula; Birth trauma, molestation 4th degree tear Low density CT	INTAKE: Trauma History deer in the headlights trauma evident in her affect, shock; separated from partner, no sex/1yr very depleted from birth	INTAKE: Untreated PFM infection after delivery can't lift her child, physical instability PP; can't engage PFMs; fecal incont. for 1st 11 mos PP	INTAKE: Diastasis re-knit this is unheard-of she's amazed and so am I.	What is the relationship btwn unwinding K's linea alba & reknitting of diastasis?
BIRTH STORY **TRAUMA HIST** **SELF IMAGE** **SEXUAL GOALS** **SOMATIC SEX-ED**	Birth Story: midwife betrayed/abandoned her Date rape@ 18yrs Self esteem low, esp PP Sex Goal: no more painful penetration!	Conversation abt boundary making, betrayal during delivery, making meaning of her birth story	More conversation about PFM dysfunction, PP depression/confusion	No need for somatic sex education I suspect she projected abandonment by mother as abandonment by midwife: denial of her hurt
INQUIRIES **BIOMECH** **BIOCHEM** **EMOTIONS** **SCARS**	Painful penetration Tight neck, shoulders, occiput glued to C1 ST@R introitus, tight scalenes, lev/scap, rhomb; suspect cranial nerve 11 compression	Deep and thick ST above Sup pubic ramus; diastasis present, painful, bleeding hemorrhoids	ST in post rectal wall; coccyx dspl 1/2" L; L hypertonic coccygeus ST in Int & Ext anal sphctr Deep ST in vag floor, X to L obturator; ST sup to L sup pub ramus	She knows her sexual anatomy. Very self-aware proprioceptively. Very present during all work; gives useful feedback.
ACTIONS	Deep myofascial work neck, shoulders, L obturator: inter-vaginal approach	Deep cross-fiber & stretching ST above pubic ramus; Unwind linea alba from inter-vaginal approach	Inter-anal work, adjust TB; free up fibrotic obturator X-fbr L coxxygeus, release hypertonic muscles	We are now teaching collaborators for scar tissue remediation workshops
OUTCOMES	relaxed and more present, coming out of shock	Can begin to engage rectus abdominis, had lost connection with it	More comfortable gait, more ability to contract PFMs, more abdominal connection and strength	PREMISE TEST/PROOF: Somatic recall produces unexpected sudden & dramatic results

Rowena

Name / Date Profession / CT type Intake, Inquiries, Actions, Outcomes	1st Session 10/10/09	2nd Session 10/13/09	3rd Session 10/22/09	NOTES on what changed
Rowena 10/17/09-11/7/09 Twins Pre-natal & PP Trainer/ Livery-y C-section/twins Cervical pain during intercourse 2yrs PP Medium dense CT	INTAKE: Lots of pain and stiffness feels like she'd 90 yrs old, SI joints, LBP, sex too painful for the first yearPP, Now cervix hurts during penetration. Sex drive non-existent for 15mos PP, insomnia, cnst.	INTAKE: slept 9 hrs after lst session,; could do wheel again - popped right into it 1st time since birth	INTAKE: grief coming up after last session, a loss. Says C-sect felt like a rape. Feeling resentful of the affects of her C-section surgery	Wanted a natural birth. They told her they would leave babies w/her, but whisked them away.She was left alone w/ anesthesiologist. took 3hrs feels emotionally scarred.
BIRTH STORY **TRAUMA HIST** **SELF IMAGE** **SEXUAL GOALS**	B/S Dr. insisted on C-sect T/H Gave her power away S/I felt dead & cut off from her power post C-sect S/G pain-free penetration SSE sex positions. CN"0"	Felt overwhelming joy returning to her life, joy had been gone since birth	Feeling weepy for "no particular reason", after contractions from last session, no wonder, is she hormonally recalibrating after last session?	Delivered beautiful testimonial for H&;K filmed at Kinzbach's home
INQUIRIES **BIOMECH** **BIOCHEM** **EMOTIONS** **SCARS**	Incision still painful 3 years later. R side of incision very raised, tight into pelvis R psoas & inguinal canal tight + tight @ ileosecal valve. Right side sacrum very tight, R/ obturator tight Bladder discomfort	Scars around linea alba, SI jt, Cervix fixated to post vaginal wall, pointed straight back, scars in L sup pubic ramus, adhesions: C-sec. incision to pubic bone, linea alba to uterus	Cervix still curled under, still painful, sex still painful like the cervix is trying to get away from incoming battering penis, found more adhesions around cervix	2nd session: Uterine contractions?! finishing her interrupted labor 3 yrs later??! She reported being abe to associate to her vaginal wall, had been dissociated from it, bladder discomfort relieved
ACTIONS	Psoas release, Slow deep pressure into C-sect scar deep tissue to TFL, buttocks, quads	Int vag: massage with castor oil to free cervical neck, feel slight whispy adhesions there. Unwind linea alba, unwind cervix	Work on adhesions around cervix, work on ridge of adhesive tissue on post cervix, got them all gone	The cervix can be freed easily by circling the finger around the cervical neck using castor oil
SOMATIC SEX-ED: COUNSELING & OUTCOMES	SSE: Pheromones & attaction sex position counseling	Cervix not hurting due to sex position change- w/her on top BMs every day - big change!	Sex was no longer painful after 3rd session	PREMISE TEST/PROOF: Mapping with palpation reduces the impact of scar tissue, reduces painful sex

Hermione

Name / Date Profession / CT type Intake, Inquiries, Actions, Outcomes	1st Session 10/10/09	2nd Session 10/13/09	3rd Session 10/22/09	NOTES on what changed
Hermione 2 children 10/25/09-11/24/09 Losing orgasmic ability and sensation, bulimia, panic attacks & choking Medium dense CT	INTAKE: Head trauma, appendectomy, ectopic pregnancy surgery, episiotomy Blinding headaches during sex, numb in vagina Period started at 10 & 1/2 yrs old	INTAKE: Understanding that scars impede sensation very relieving. Doesn't feel crazy about it anymore, has freed up energy & hips are looser in her yoga practice	INTAKE: Noticing SUI coughing A LOT last week, now having "perfect poops"	She would drink herself to passing out when having sex as a young woman. Felt dirty about sex, but was able to give herself orgasms by squeezing her legs together.
BIRTH STORY **TRAUMA HIST** **SELF IMAGE** **SEXUAL GOALS** started sex @14yrs sexual shame issues, dissociation, numbness as a way to "just get through"	3 epidurals, pelvic block & C-sect prep, delivered vaginally M/L epis., vaginal "tuck" due to vag "hanging out" Feels 'dirty' around sexuality, bulimia separated from husband during preganacy	Panic attacks are better, choking sensation much better. apdx scar work has released a lot of fear.	Vagus compression due to head trauma; feeling annoyed about her bulimia	3rd session: orgasms have become deeper with more sensation, rethinking her approach to relationship, how to negotiate more meaning with a partner, rather than just needing him for sex and/or status
INQUIRIES **BIOMECH** **BIOCHEM** **EMOTIONS** **SCARS**	Fascial adhesions @appen. scar, scars on R obt; epsi scar running up R labial lip; found scars inside anus, connected to appnd. scar, coccyx displaced	Tension in masseter still emotion in apdx scar Epis scar work produces much coughing (bulimia release) inner-anal tension/holding related to apdx scar	Palpation of sub-occipital area, palpation, stretching, pulling on scar tissue, (anchor and pull), appendix/anal connection of adhesions & ectopic preg scar	2nd session: lots of talking - is she avoiding feeling (Peewit behavior?) some genuine release, emotional release about losing her sister rage turns to despair & grief
ACTIONS	Decomp occipital condyle; abdominal work - ileosecal valve release; internal anal scar palpation and massage w/CO, correct coccyx displmt	Slow friction over scars using CO, inter anal massage. Hedda uses sound to move through nausea - new neuronal connections coming online	CV4; more unwinding of tension at occiput, more internal anal massage, releasing apdx scar from inter-anal approach	1st session: heat in her feet, Feels like she "has her head on straight"
SOMATIC SEX-ED: COUNSELING & OUTCOMES	Wants to feel orgasms again, get out of destructive and dissociative patterns in her relationships	Suggest: Taoist Erotic Massage, Limbic Recoding around birth exp Yoga Nidra, get in touch w/ her feminine power	States that women need experiences like this to reframe their (her?) sense of deserving; re-evaluate their sense of themselves	PREMISE TEST/PROOF: Assessment as therapy; understanding one's place in the four domains is healing in and of itself

Ruth

Name / Date Profession / CT type Intake, Inquiries, Actions, Outcomes	1st Session 10/10/09	2nd Session 10/13/09	3rd Session 10/22/09	NOTES on what changed
Ruth 3/12/10-3/27/10 bodyworker, SMSC 1 child baby came very quickly,12 hrs labor; born w/1push 2nd degree tear Extreme low density CT	INTAKE: Painful sex after birth; for whole 1st year PP; somewhat better but still painful she is primary breadwinner, working 6 weeks PP Hemorrhoids	INTAKE: Could look for & look at scar 1st time since birth.	INTAKE: able to talk to her daughter about sex, shame has evaporated, and she feels ready to discuss w/her 8-yr-old Having good, pain free sex	1st session: Mourning the loss of her pre-pregnancy body. Doesn't think increasing her sexual confidence would increase her self esteem.
BIRTH STORY **TRAUMA HIST** **SELF IMAGE** **SEXUAL GOALS** History of chronic constipation, uses coffee enemas to go now	Barely made it to the hospital; unmedicated birth irregular labor, water never broke; membranes came out when baby crowned refused epis. 2nd degree tear, got stitched	Scar going deep inside from tear. Whole finger's length internal vaginal. tension in R obturator, back to coccygeus; thick as a pinky finger	Tension in coccygeus - historical & related to constipation history, scars in anal sphincter- due to tears - 3rd degree after all? Emotional release in piriformis, burning there	2nd session: Sex negativity prevents our physiology from ability to our abilities to orgasm, labor, and arouse at will - feeling more relaxed and excited about future sexual exploration
INQUIRIES **BIOMECH** **BIOCHEM** **EMOTIONS** **SCARS**	Worked on her own ST using olive oil. didn't want to look at it or relate w/it; GB20 wide open, waves & tetany; adhesion btwn iliacus, psoas, ovary, colon L side	Big chunks (blueberry sized) back behind cervix, can feel the pull as scar is palpated; feels like cervix has torn as well, due to rapid delivery	Deep work inter-vaginal & inter-anal together. lots of breath and pressure into L & R side obturators, Co application into both vag & anus	3rd session, " I remember how it feels not to hold tension in my pelvis! She had been holding on so tightly for so long. Related to care-taking her family, esp alcoholic dad & uncles
ACTIONS Became ejaculatory PP, G-spot is more sensitive Improved self image PP, more grounded since pregnancy - felt stoned during her whole pregnancy	Psoas release, getting breath open, cross fiber QL, erectors; holding emotion in TFL; moving heat & qi	Internal vaginal CO massage, somatic sex ed: mapping of clitoris & G-spot. Work on PF contraction, taught ashwini mudra practice to tone PFMs	Got heat into anus - this is big for Ruth w/her intense history of constipation. Chronic PFM tension let go at last	2nd session: Scars are melting in real time with treatment qi is moving as scars melt. Reported tension is melting feeling heat to her feet
SOMATIC SEX-ED: COUNSELING & OUTCOMES	Came from very conservative family. Now re-evaluating her values and coming into more self-	Homework: read book about accountability in relational communication: Don't Be Nice, Be Real	Kinzbach: we can't fathom our orgasmic potential. Ruth says she is ready to start trying!	PREMISE TEST/PROOF: Somatic sex ed: sex-ed and genital mapping improves sex life

Lucky

Name / Date Profession / CT type Intake, Inquiries, Actions, Outcomes	1st Session 10/10/09	2nd Session 10/13/09	3rd Session 10/22/09	NOTES on what changed
Lucky 10 mos PP 3/13/10-3/27/10 bodyworker, SMSC 1 child,10mos vaginal birth CT Type: very dense	INTAKE: Sex too painful - Feels disconnected from herself., can feel PF pain & tightness when she coughs, outer labial & PF tears	INTAKE: jaw relaxation Things are not good at home, her husband is demanding an unsympathetic to her needs, selfish and childish Kinzbach suggests reading abt NVC, Get Real	INTAKE: Lucky & her baby both got sick., more arguments w/husband about his lack of help around the house. He won't go to therapy w/her. Needs to learn how to stick up for herself.	INTAKE: It felt like her labor spun out of control, too much bright light, antibiotics, cord cut too soon, no one present knew how to help her
BIRTH STORY **TRAUMA HIST** **SELF IMAGE** **SEXUAL GOALS** Sex too painful to attempt	24 hr labor, epidural 12 hrs felt dissed by anesthesi., told her to stop being a martyr tore in 3 places, can't look @ her PF now	Scar tissue at introitus, taught her self-massage in this area so she could continue treatment at home	Lucky is getting in touch with her anger and disappointment about his selfishness and infantile behavior.	3rd session:Re-evaluating her relationship with her husband, is he meeting her needs? she is less worried about meeting his needs, priority: her needs
INQUIRIES **BIOMECH** **BIOCHEM** **EMOTIONS** **SCARS**	Int shoulder rotation from breastfeeding; tender in GB20; TFL holding emotion; L psoas tight	Found scar @G-spot, test for PFM tone, experiential anatomy lesson, genital mapping w/sensation mapping	More painful scar tissue on internal vag exam.Feels like bubble wrap.	2nd session: "I feel emotionally confident - I don't feel like and injured bird anymore."
ACTIONS Still breastfeeding: sex hurts more than the first time - esp when he hits the scars. Just wants to feel desire again.	Shoulder protocol to loosen and free ROM; Cranial work to down-regulate; then deep tissue in legs, psoas	Blueberry chunks of scar tissue inside her vag. obturator massage feels very soothing. massage of vag ST breaks it up, seh can feel back side of clit, feels "heavenly"	Work on inter-vaginal ST to loosen it from its attachments, suddenly blueberry chunks dissolve. Pain dissolves too. She is held and nurtured by Kinzbach.	1st session: "I feel like liquid." she moved heat, big emotional release, tingling tears of happiness, legs are shaky, had to lie down to get her bearings.
SOMATIC SEX-ED: COUNSELING & OUTCOMES got one massage since delivery, her body shook for 10 min trauma from birth?	Suggestion that her husband could hold space for her to just relax and receive touch and attention The Languages of Love;	Doesn't know where her G-spot is, confusing G-spot sensation with clitoral sensation, Kinzbach does genital mapping session w/mirror, Lucky can find her own ST & work on it at home.	More "girlfriend" advice about improved communication, taking responsibility for being heard accurately.	PREMISE TEST/PROOF: Use of castor oil & somatic sex ed + "girlfriend" support enables better life choices and more self-sovereignty

BIOGRAPHICAL SKETCH

Ellen Heed studied dance at California Institute of the Arts from 1975-1979. She was drafted to join dance company Rodeo ex Machina before completion of her BFA. This company performed, toured and taught master classes in Los Angeles, as well as the California State and UC systems from 1979-1985. When knee problems put an end to her dance career, Ellen learned sweater-making and fashion design. She started a garment company in 1986, selling art-to-wear sweaters to better women's specialty and department stores nationwide.

During this period, Ellen undertook a journey into Transpersonal Psychology. This study included amateur ethnobotany and the traditional use of plants in pursuit of healing. With her then partner, she traveled widely to collect, study, analyze, grow, and preserve endangered species of obscure medicinal plants. This opened a door into the pursuit of health, utilizing intuitive cultural methodologies and botanical tools, and included an introduction to TCM and Chinese herbalism. Caribbean, African, South American and Mexican plant traditions were also studied, focusing on the way these plants were used to promote emotional and physical healing,

It was with extreme excitement that Ellen was introduced to the possibility that hands-on therapies might be used to produce similar emotional and physiologic effects to those observed in the shamanic and Eastern traditions previously mentioned. This led to acquisition of multiple certifications in Shiatsu, Deep Tissue/Emotional and Structural Release work, Visionary Craniosacral Work, Yoga, and Sexological Bodywork. Ellen completed her Bachelor and Master's degrees at IUPS, as well as her Doctorate.