Physical Therapy in the Treatment of Central Pain
Mechanisms for Female Sexual Pain

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ABSTRACT

Introduction: The complexity of female sexual pain requires an interdisciplinary approach. Physical therapists trained in pelvic health conditions are well positioned to be active members of an interdisciplinary team addressing the assessment and treatment of female sexual pain. Changes within physical therapy practice in the last ten years have resulted in significant utilization of pelvic floor muscle relaxation and manual therapy techniques to address a variety of pelvic pain conditions, including female sexual pain. However, sexual pain is a complex issue giving credence to the necessity of addressing all of the drivers of the pain experience—biological, psychological and social.

Aim: This review aims to reconcile current pain science with a plan for integrating a biopsychosocial approach into the evaluation and subsequent treatment for female sexual pain for physical therapists.

Methods: A literature review of the important components of skilled physical therapy interventions is presented including the physical examination, pain biology education, cognitive behavioral influences in treatment design, motivational interviewing as an adjunct to empathetic practice, and the integration of non-threatening movement and mindfulness into treatment.

Main Outcome Measure: A single case study is used to demonstrate the biopsychosocial framework utilized in this approach.

Results: Appropriate measures for assessing psychosocial factors are readily available and inform a reasoned approach for physical therapy design that addresses both peripheral and central pain mechanisms. Decades of research support the integration of a biopsychosocial approach in the treatment of complex pain, including female sexual pain.

Conclusion: It is reasonable for physical therapists to utilize evidence based strategies such as CBT, pain biology education, Mindfulness Based Stress Reduction (MBSR), yoga and imagery based exercises to address the biopsychosocial components of female sexual pain.

INTRODUCTION

Patients seek alleviation of pain as one of their primary goals when enlisting the services of a physical therapist. The International Association for the Study of Pain (IASP) defines pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.” When described in “terms of such damage,” pain could be incorrectly correlated to specific tissue problems because the structures themselves are what physically hurt. This is true for all types of pain, including female sexual pain. The IASP definition of pain informs the rehabilitative efforts in physical therapy. Best practice suggests that physical therapists look beyond the biomedical approach to rehabilitation and integrate pain education with the careful targeting of central and peripheral pain mechanisms when treating persistent sexual pain.

The clinical presentation of pelvic pain is richly and historically dominated by central pain mechanisms. Mechanisms underlying chronic pain differ from those underlying acute pain. In chronic pain states, central nervous system factors play particularly prominent roles. In the absence of anatomic causes of persistent pain, medical subspecialties have historically applied
wide-ranging labels (eg, fibromyalgia, irritable bowel syndrome, interstitial cystitis, or somatization) for what is emerging as a single common set of central nervous system processes. The hallmark of these “centrally driven” pain conditions is a diffuse hyperalgesic state identifiable using experimental sensory testing and corroborated by functional neuroimaging. The characteristic symptoms of these central pain conditions include multifocal pain, fatigue, insomnia, memory difficulties, and a higher rate of comorbid mood disorders. Through decades of research, Woolf identified a cluster of syndromes related to sexual pain that is dominated by central pain mechanisms in his symptom inventory, including endometriosis, vulvodynia, irritable bowel syndrome, interstitial cystitis or bladder pain syndrome, and vestibulodynia. All these syndromes potentially contribute to female sexual pain.

Female sexual pain is complicated clinically by:

1. The involvement of multiple systems, including gynecologic, urinary, gastrointestinal, and muscular systems. Cross-talk in the dorsal horn of the spinal cord contributes to the complexity and interconnectedness of these conditions. Cross-talk has the potential to add additional input to the incoming nociceptive and sensory information from the multiple systems involved in pelvic pain. Cross-talk refers to the communication of afferent input from one organ, which affects the efferent output response to other organs through the firing of interneurons in the dorsal horn. The literature demonstrates cross-system, viscera-visceral interactions in which pathophysiology in one organ influences the physiology and response to pathophysiology of another organ. Even if other organs are healthy, the evidence suggests that cross-talk interactions are part of the process that brings about comorbid pelvic pain conditions. Cross-talk contributes to challenging pelvic pain conditions in which pain can be present in the absence of observable, clinical pathology. This increased input to the dorsal horn might facilitate or upregulate input from the periphery and viscera to the spinal and supraspinal pathways, leading to hypersensitivity in the cortical structures involved in pain.

2. Social and religious implications of the pelvic structures and sexuality further complicate the patient’s experience of pelvic pain and sexual dysfunction. One must consider each individual’s emotional readiness to have open discussions about sexual function. There also might be cultural taboos in providing treatment to this sensitive area.

3. Further sensitization also might be contributed to by health care providers who do not adequately screen for bowel, bladder, and sexual pain because of their own discomfort or lack of awareness of the interactions of these structures to sexual function. This can lead to a lack of referral for appropriate treatment. Patients also might develop a mistaken belief that there is no treatment available for this vulnerable area, and that they are unable to get well.

UNDERSTANDING THE “BIO” IN BIOPSYCHOSOCIAL

To treat female sexual pain effectively, physical therapists should complete an evaluation that includes (but is not limited to) a thorough musculoskeletal examination. This evaluation includes a vaginal and/or rectal examination, sensory awareness testing, assessment of pain biology knowledge, and standardized screening for fear avoidance assessment, catastrophizing assessment, and determining the patient’s expectations and beliefs concerning her pain and dysfunction. A well-organized initial evaluation requires the integration of a biopsychosocial framework in which all three components are addressed simultaneously rather than in sequence, or more commonly, only when a biomedical approach has failed. All three components require consideration; the biological drivers are critically important, as are the individual’s thoughts, beliefs, and expectations and the social makeup of the individual in pain.

Pelvic floor tenderness and a positive forced FABER (flexion, abduction, external rotation test of the hip) test result are predictors of chronic pelvic pain in women compared with healthy controls. The overactive pelvic floor is also a plausible biological driver of chronic pelvic pain and needs to be considered when addressing pelvic pain in a biopsychosocial framework. Therefore, a thorough biomedical physical therapy assessment, including the muscles, nerves, connective tissues, and joints of the lumbo-pelvic region, should be considered in all patients who have pelvic floor tenderness and a positive forced FABER test result. Pelvic health physical therapists are specifically trained to assess musculoskeletal function through vaginal, rectal, and external evaluation and design an individualized program to address the musculoskeletal loading capacity of the pelvic girdle. Dermatologic involvement of the vulva, anus, and perineum, involvement of visceral structures and systemic problems such as autoimmune disorders and endocrinologic disorders also need to be addressed by members of the medical team. This multisystem biomedical approach has become the standard of practice for persistent pelvic pain in the past several years, which is a major step forward in the treatment of these challenging conditions. However, a purely biomedical approach is insufficient when treating female sexual pain, according to the IASP definition of pain, because pain can be produced as a response to the belief or expectation of “potential” danger.

Pain is multifactorial and, as Pukall et al demonstrated, involves structures throughout the entire person, including cortical changes. Pain can be produced in the absence of nociception or tissue dysfunction. When pain is associated with the threat of “potential tissue damage,” one can see challenging clinical presentations. The central nervous system might determine that there is a need for heightened vigilance of the area because of this “potential” for damage correlated to a patient’s beliefs, fears, and expectations. This can result in a protective pain response that is unrelated to the health of the pelvic muscles, skin, or the visceral systems involved and might be the driving force in
the perpetuation of hypersensitivity. \(^8,19\) Empathy and motivational interviewing skills are part of a critical skillset for this component of the evaluation to effectively reconceptualize pain.\(^{20}\)

COMPONENTS OF A BIOPSYCHOSOCIAL APPROACH

Integrating the treatment of central pain mechanisms into clinical practice requires the consistent use of a biopsychosocial perspective. Key components of a biopsychosocial approach are outlined below\(^{21}\):

1. Take the time to listen and encourage the patient to share all the important contributions to her symptoms.
2. Validate the patient’s pain experience and provide reassurance that although the painful area might be in need of better movement or relaxation, the painful area might not be damaged. This requires that the physical therapist accurately understands pain biology and be able to effectively communicate it to the patient in a way that establishes evidence of safety.
3. Remain committed to looking at the entire person: her biology, her thoughts and beliefs, and her interaction with the world around her.

A BIOPSYCHOSOCIAL APPROACH GIVES HOPE

One of the most important things that clinicians can do to facilitate a positive treatment outcome is to provide reasoned hope for their patients that they can and will improve.\(^{22}\) Physical therapists have the opportunity through the careful choice of words and appropriate treatment prescription to ensure that they do not create further “threat” for their patients.\(^{23}\) The simplest example of this is the use of the term chronic vs persistent when referring to longstanding pain. Chronic connotes the notion of permanence. Persistent implies that pain has lasted longer than expected. With the removal of nociceptive inputs, and a change in thoughts, beliefs, and attitudes, “persistent” pain can resolve. Subtle shifts in the words chosen are integral when treating central pain mechanisms and the beliefs that drive them. Because the placebo effect is in essence a psychosocial context effect, research indicates that different social stimuli, such as words and rituals of the therapeutic act, can change the chemistry of the patient’s brain in a positive way.\(^{24}\)

Conversely, it is important to recognize that negative treatment outcomes have a nocebo effect if careful examination of the appropriate drivers is not addressed from the beginning.\(^{21,24}\) Patients experience multiple negative outcomes with failed treatment. Careful assessment of all possible contributors to their pain from the beginning can create realistic but hopeful treatment expectations.\(^{21,24}\) This will give rise to positive patient expectations with treatment. Placebo research suggests that the ritual of positive expectation of treatment is important in optimizing patient outcomes.\(^{24}\)

EVALUATION OF CENTRAL PAIN MECHANISMS IN SEXUAL PAIN

Smart et al\(^{22}\) carried out a series of Delphi studies to determine the key factors for identifying central pain mechanisms within musculoskeletal pain based on the subjective and objective evaluation. The research validated four specific areas to assess when completing a subjective and objective evaluation, which provide a predictive likelihood ratio of the relevance of these factors in a patient’s presentation to identify the presence of central pain mechanisms.\(^{22}\)

1. The presence of disproportionate, non-mechanical pain, including hyperalgesia and allodynia, represents a 30:1 odds ratio that the patient is presenting with central pain mechanisms. Interstitial cystitis or bladder pain syndrome, irritable bowel syndrome, and vulvodynia are hallmark pelvic pain conditions that demonstrate hypersensitivity and allodynia.\(^3,5,14\)
2. When pain persists beyond the expected timeframe for healing (12–16 weeks), there is a 27:1 odds ratio that the patient is presenting with central pain mechanisms. There is a diagnostic delay of at least 8 years on average in pelvic pain from first presentation of symptoms. Most women presenting with sexual pain are well beyond natural healing timeframes and central pain mechanisms need to be considered.\(^{14}\)
3. The presence of diffuse or widespread pain represents a 15:1 odds ratio that central pain mechanisms are a significant driving factor. Comorbid conditions are very common in pelvic pain and necessitated the creation of the Multidisciplinary Approach to the Study of Chronic Pelvic Pain (MAPP) network to study these conditions representing diffuse and widespread pain.
4. The identification of psychosocial factors such as fear avoidance and catastrophizing leads to a 7:1 odds ratio that the patient is presenting with central pain mechanisms. There is rigorous research that connects these psychosocial constructs within interstitial cystitis or bladder pain syndrome, vulvodynia, and endometriosis.\(^7,14,17\)

Using the Central Sensitivity Inventory (CSI) also will assist the physical therapist to identify the presence of central pain mechanisms.\(^{25}\) The CSI is a self-report screening instrument used to identify patients with central sensitivity syndromes, including fibromyalgia. There are two parts to the inventory. Part A asks characteristic questions to assess central sensitization, and a score is derived.\(^{25}\) A score higher than 40 represents moderate severity of a central pain-dominated presentation.\(^{25}\) Part B is a list of conditions characterized by central sensitization. These include the conditions identified by Woolf\(^9\) as stated earlier and should be very familiar to the pelvic health practitioner.\(^3,9\) These conditions are:

- Fibromyalgia
- Chronic fatigue syndrome
- Irritable bowel syndrome and other functional gastrointestinal disorders
ASSESSING THE PSYCHOSOCIAL COMPONENTS FRAMES THE TREATMENT APPROACH

It is important to reiterate that central pain mechanisms are present to protect the individual from actual and potential threats, and they represent adaptive changes within the central nervous system. Through a careful history, the clinician might be able to identify personal challenges or threats that were present for the patient when the pain began. The use of validated screening tools for assessing the presence of negative appraisals and cognitions that contribute to persistent pain states is of paramount importance when using a biopsychosocial approach. Tripp et al provided a biopsychosocial example in their phenotypic approach when assessing and treating women and men with bladder pain syndrome. Fear avoidance and catastrophizing are strong predictors of the presence of central pain mechanisms contributing to the patient’s pain presentation. The Pain Catastrophizing Scale (PCS) and Tampa Kinesiophobia Scale (TSK) are simple, free, validated tools that help to direct assessment and treatment strategies. The presence of high levels of fear avoidance and catastrophizing are strong indicators that pain education and other behavioral treatments are warranted to address these cortical changes. These questionnaires take less than 5 minutes to complete and less than 1 minute to score. The literature supports the integration of these tools into clinical practice.

The assessment of mental distress is another central aspect of pain research and treatment. The Depression, Anxiety, Stress Scale (DASS) is a reliable questionnaire, free to use, and brief to administer. It is a great alternative to the previously used instruments for the screening of depression. Furthermore, the stress subscale measures irritability and tension within the system, which are important aspects of the pain experience but underused in assessment procedures for the diagnosis and treatment of patients with pain.

When failing to measure these psychosocial factors, physical therapists lose the opportunity to address them in treatment when it is within their scope of practice. They may also miss opportunities to assess the need for potential referrals within an interdisciplinary team when these impairments and challenges fall beyond their scope of practice. Further, it is challenging to measure the patient’s clinical response to the interventions provided if assessment psychometric measurements are not completed. Psychometric measurements are an important component of the physical therapist’s assessment because pain is always a “sensory and emotional” experience.

ASSESSING THE TISSUES INFORMS THE TREATMENT APPROACH

The physical examination provides important information about potential tissue-based drivers that should not be overlooked. Physical findings can include tight or stiff tissues, weak or deconditioned muscles, scar tissue, peripheral sensitization (ie, pudendal neuralgia), signs of central sensitization (ie, allodynia, hyperalgesia, pain brought on without provocation), vascular issues, and visceral dysfunction. Physical therapists using a biopsychosocial-informed physical examination should:

1. Apply a consistent scientific approach to labeling dysfunctional tissue with respect to normal healing timeframes. As stated earlier, tissues heal in 12 to 16 weeks. There are only a few exceptions to this rule, such as complex fractures and wounds with gaping edges. Hunner lesions might be another exception. Telling patients that they are a “slow healer” is not supported by evidence. Accurately describing tissue dysfunction as tightness or weakness rather than biomechanical faults, which have poor clinical correlation, is important for establishing strong self-confidence and self-efficacy. These tissue-based inputs should not be overlooked or ignored as a possible nociceptive input into the nervous system. Care needs to be taken to use accurate language. The overactive pelvic floor is a more accurate tissue descriptor than referring to stiff or hyperactive areas as trigger points. Pathologizing muscular tension can create further guarding and bracing for the patient.

2. Describe the possible biological drivers in the physical evaluation and avoid the use of words and phrases such as “pinched nerve, degenerative disc disease, scar tissue, latent trigger point, or you will have to live with it.” These phrases are not an accurate reflection of available scientific knowledge and can mislead patients into thinking they cannot get better. Many people have these conditions but do not suffer from pain; these conditions might have little clinical relevance to the pain experience.

3. Assess the quality of a patient’s movement and tissue health. If a patient has global restrictions in multiple areas (diffuse pain), dysfunctional movement patterns such as cogwheeling (a sudden brief halt in an otherwise smooth motor activity) or poor contraction and relaxation patterns and poor tactile acuity (awareness to the sensation of touch) of the pelvic floor, it is likely that cortical errors in sensorimotor integration are a dominant driver of the patient’s presentation. Asking the patient to contract and relax the pelvic floor repetitively to assess the quality of the movement can test for the presence of cogwheeling as well as contraction and relaxation smoothness.
Having the patient identify the location of touch during a pelvic floor examination also can test tactile acuity.

4. Test for the presence of hyperalgesia and allodynia with light touch. There is a lack of objective data to consistently and reliably test pelvic floor pain pressure thresholds within the clinic. Pukall et al. demonstrated the relevance of decreased pain pressure thresholds in patients with vestibulodynia, but normative data has not yet been established. There also are no commercially available standardized and validated measurements of pressure thresholds in the pelvic floor. However, left- and right-side touch can be compared. Comparison against other tissues in the body also can be made for the presence of hypersensitivity. This is an area of ongoing research and development.

5. Identify the balance between tissue drivers and the influence of the sensitive nervous system. Use of a schematic approach to ascertain the relative contribution of tissue dysfunction vs central pain mechanisms can be helpful (Figure 1). Using this simple tool after a thorough evaluation can help the therapist and patient plan the appropriate balance between targeting tissue dysfunction and the sensitized nervous system. Assessing the individual’s response to treatment of the tissues, evaluating the individual’s negative appraisals and cognitions, and unraveling the threats that drive the individual’s pain state often requires multiple visits.

**TREATMENT DESIGN FOR CENTRAL PAIN MECHANISMS**

Female sexual pain often presents with centrally driven mechanisms associated with a sensitive nervous system. The evaluation as described previously can provide clues to the necessity for re-conceptualizing pain in each individual patient presentation. Pain is a powerful defense. An important question to answer within your evaluation is, “What protection does the pain provide for this person?” A follow-up question should be, “Is that protection needed now or is the pain system itself driving her symptoms?”

**PAIN BIOLOGY EDUCATION INTEGRATES THE BIOPSYCHOSOCIAL APPROACH**

Pain biology education brings physiologic understanding to the maintenance of persistent pain states by understanding the physical changes within the central and peripheral nervous systems which occur in these states. Pain biology education is key to empowering patients; it is affordable, non-addictive, easily understood, and it can be made available individually or in groups. Pain biology education is the process of sharing accurate information of the biology of the pain system using current pain science in clear terms, often with the use of metaphors for explanation in a way that each individual can comprehend. Pain biology education helps a person in pain to develop an understanding of the nature of the pain, the neurophysiologic mechanisms underlying it, and the role that persons plays in treating their pain. Passive pain management with pain medication should be only a short-term solution to help patients get started. Pearson suggested telling patients that the purpose of pain medication is to help them move better and that pain medications are “movement pills.” Asking a patient dealing with pain to move, even in graded amounts, can be overwhelming and the movement can cause an increase in symptoms in highly protective individuals. Pain medication could be helpful to start. As a physical therapist, a request to start moving is best preceded by accurate pain biology education.

Pain biology education can be provided in the clinic as part of routine treatment. With an appreciation of the pain system,
patients can reconceptualize persistent pain as an overprotective response of their nervous system. They learn that the nervous system has physically adapted as part of a complex protective response. Through education, patients can be empowered to change their beliefs and decrease the threats that perpetuate their pain cycle. This can lead to a change in their pain response. This is a reasonable and achievable goal that has been studied in back pain and complex regional pain syndrome. Educating patients about pain can change their pain levels more than any other current modality for persistent pain. Through pain biology education, the goal is to help patients understand, respect, and, most importantly, not fear their pain experience. Resources exist for working through the reconceptualization of pain using a self-assessment of “dangers in me” and “safety in me” as proposed by Moseley and Butler. This strategy can provide a truly individualized path to recovery, which addresses the biological, psychological, and social drivers of the pain experience and promotes self-efficacy.

**Table 1. Choosing treatment options based on assessment findings**

<table>
<thead>
<tr>
<th>Findings on assessment</th>
<th>Clinical characteristics</th>
<th>Treatment options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Catastrophizing</strong></td>
<td>PCS score &gt; 20</td>
<td>Pain education</td>
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<tr>
<td></td>
<td>Hypervigilance</td>
<td>Mindfulness meditation</td>
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<td></td>
<td>Helplessness</td>
<td>CBT</td>
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<td></td>
<td>Rumination</td>
<td>Address social support</td>
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<tr>
<td><strong>Stress</strong></td>
<td>DASS stress score &gt; 19</td>
<td>Pain education</td>
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<tr>
<td></td>
<td>Flight</td>
<td>Breathing in a relaxed position</td>
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<tr>
<td></td>
<td>Flight</td>
<td>Yoga</td>
</tr>
<tr>
<td></td>
<td>Fight</td>
<td>Sleep hygiene and architecture</td>
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<tr>
<td></td>
<td>Freeze</td>
<td>CBT</td>
</tr>
<tr>
<td><strong>Anxiety</strong></td>
<td>DASS anxiety score &gt; 10</td>
<td>Pain education</td>
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<td></td>
<td></td>
<td>Self-soothing routine</td>
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<td></td>
<td></td>
<td>Gratitude training</td>
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<tr>
<td></td>
<td></td>
<td>CBT</td>
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<tr>
<td><strong>Fear avoidance</strong></td>
<td>TSK score &gt; 42</td>
<td>Pain education</td>
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<td></td>
<td></td>
<td>CBT</td>
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<tr>
<td></td>
<td></td>
<td>CFT</td>
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<tr>
<td></td>
<td></td>
<td>Graded exposure</td>
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<tr>
<td></td>
<td></td>
<td>Graded motor imagery</td>
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<tr>
<td><strong>Allodynia</strong></td>
<td>Light touch causes pain</td>
<td>Manual therapy that does not produce pain</td>
</tr>
<tr>
<td></td>
<td>Processing errors of the sensorimotor cortex</td>
<td>Lack of awareness (“where is it and what does it feel like?”)</td>
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<td></td>
<td></td>
<td>Pain education</td>
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<tr>
<td></td>
<td>Cogwheeling</td>
<td>Feldenkrais lessons</td>
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<td></td>
<td>Lack of ownership (“is this mine?”)</td>
<td>Yoga</td>
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<td></td>
<td>2-point discrimination</td>
<td>Qi Gong</td>
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<td></td>
<td></td>
<td>Tai Chi</td>
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<td></td>
<td>Diffuse, non-specific pain</td>
<td>Dance</td>
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<tr>
<td></td>
<td>Non-mechanical functional limits</td>
<td>Franklin exercises</td>
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<td></td>
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<td>Mindful movement</td>
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</table>

**TARGETING CORTICAL STRUCTURES**

Physical therapists should target cortical structures in their treatment plan when there is evidence of central pain mechanisms in the patient’s presentation. Descending cortical inhibition can help downregulate the sensitive nervous system and can limit the impact of nociceptive input coming into the spinal cord from the tissues. Downregulation involves the release of inhibitory neurotransmitters into the synapse to decrease the sum of the neural response that occurs when the brain concludes that a threat exists. The activity in these descending pathways is not constant and can be modulated. The use of techniques that decrease vigilance and modify the stress response can enhance the activity in these descending pathways and help to decrease the sympathetic nervous system response. A variety of techniques can be chosen based on the information gathered during the assessment using psychometric measures and the assessment techniques described earlier.
summarized in a chart based on the clinical characteristics of the patient’s presentation (Table 1). The levels of evidence are variable and rely primarily on clinical experience or the sources cited earlier. Certainly some of the clinical symptoms in listed Table 1 exist in individuals without central sensitization, so they are correlated but not necessarily causative.

PHASES OF TREATMENT FOR FEMALE SEXUAL PAIN

Pain biology education, targeting cortical structures, promoting tissue health to decrease nociceptive input in a non-threatening way, grading exposure to functional goals, and restoring independence and self-management are important tasks of a biopsychosocial treatment plan for physical therapists. Balanced treatment of central and peripheral pain mediators should follow a progressive format that helps the clinician design and develop an appropriate treatment program for the individualized experience of pain. Five phases of treatment are presented in Table 2.

### Table 2. Phases of treatment for female sexual pain

<table>
<thead>
<tr>
<th>Phase</th>
<th>Stage</th>
<th>Treatment</th>
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<tbody>
<tr>
<td>1</td>
<td>Assessment</td>
<td>Determine peripheral and central mediators of pain</td>
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<td></td>
<td></td>
<td>Complete measurements: PCS, TSK, CSI, DASS (repeated at multiple intervals for reassessment)</td>
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<td></td>
<td>Complete appropriate musculoskeletal evaluation¹⁵</td>
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<td></td>
<td>Identify strengths on which to build treatment</td>
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<td></td>
<td></td>
<td>Start pain biology education³⁹</td>
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<td>2</td>
<td>Desensitization</td>
<td>Complete diagonal diagram (Figure 1)</td>
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<td></td>
<td>Address peripheral mediators with non-nociceptive manual therapy and/or non-threatening movement</td>
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<td></td>
<td>Restore and normalize sensorimotor awareness</td>
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<td></td>
<td></td>
<td>Maximize activities that downregulate central nervous system:</td>
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<tr>
<td></td>
<td></td>
<td>• Breathing exercises</td>
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<tr>
<td></td>
<td></td>
<td>• Guided relaxation or meditation</td>
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<tr>
<td></td>
<td></td>
<td>• Qi Gong and Tai Chi</td>
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<tr>
<td></td>
<td></td>
<td>• Yoga</td>
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<td></td>
<td></td>
<td>• Increase joy and laughter</td>
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<td></td>
<td></td>
<td>CBT, and other positive affirmations</td>
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<tr>
<td>3</td>
<td>Graded imagery</td>
<td>Use with highly sensitized individuals who experience a pain response just by thinking of the triggering movement or functional activity</td>
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<tr>
<td></td>
<td></td>
<td>Progressions include:</td>
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<tr>
<td></td>
<td></td>
<td>• Right vs left discrimination (Laterality)</td>
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<td></td>
<td></td>
<td>• Visualization of others doing the movement</td>
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<tr>
<td></td>
<td></td>
<td>• Visualization of oneself doing the movement</td>
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<td></td>
<td></td>
<td>• Mirror work as appropriate</td>
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<tr>
<td>4</td>
<td>Graded exposure</td>
<td>Establish value-based, patient-centered goals</td>
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<tr>
<td></td>
<td></td>
<td>Stepwise progression to return to functional activity</td>
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<td></td>
<td></td>
<td>Establish flareup plan and use it</td>
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<tr>
<td></td>
<td></td>
<td>Use neurodynamic movements as needed to optimize tolerance to movement</td>
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<tr>
<td>5</td>
<td>Supported independence</td>
<td>Establish self-efficacy³⁰</td>
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<tr>
<td></td>
<td></td>
<td>Support progress with checkups and progression as needed</td>
</tr>
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</table>

CBT = cognitive behavioral therapy; CSI = central sensitivity inventory; DASS = Depression, Anxiety, Stress Scale; PCS = Pain Catastrophizing Scale; TSK = Tampa Kinesiophobia Scale.

### CASE EXAMPLE

**Phase 1: Assessment**

Glenna is a 49-year-old woman with two grown children. She is an investment banker and sits for most of her day. She had her coccyx surgically removed 2 years previously secondary to persistent coccygeal pain. Her coccygeal pain started after sustaining soft tissue injuries from a fall 3 years before surgery. Her pain impaired her lifestyle significantly, resulting in surgical removal of her coccyx; unfortunately, this did not provide any significant relief from her pain. Glenna also presented with deep dyspareunia; she experienced pain during intercourse, which flared her symptoms for 24 hours afterward. Glenna reported urinary urgency as her third complaint. Glenna is a cyclist and enjoyed doing spin classes three times a week before her injury. Her goals included returning to pain-free sitting at work, pain-free intercourse, and spin classes three times a week.

Glenna reported that she had burning pain in her left ischial tuberosity and perineum. Her pain score was 8 of 10. Her posture was stiff and rigid; she also reported upper back and neck
pain. Glenna reported constant burning in her feet, which worsened when she stood for longer than 30 minutes. Her pain was quite diffuse at assessment, although originally it had started as localized coccyx pain. She had previous physiotherapy directed at the pelvic girdle as well as Chinese medicine and acupuncture. She currently sat with a donut cushion for a maximum of 10 minutes. She managed to work from home, going into the office several times per week for 2 to 3 hours; she varied her position between sitting, standing, and lying down while working on the computer.

On initial assessment, Glenna scored 29 of 68 on the TSK, demonstrating low fear avoidance, which fit with her ability to adapt her positions and stay functionally employed. She scored 44 of 52 on the PCS, demonstrating severe catastrophizing scores. She scored high in all three subcategories, including helplessness, rumination, and hypervigilance. Glenna scored 16 on the anxiety portion of the DASS scale, which placed her in the severe category for anxiety. Her CSI score was 52. A score higher than 40 is considered positive for central sensitization.

On physical examination, Glenna presented with negative testing results for the pelvic girdle including provocative testing for the sacroiliac joint and the active straight-leg raise test. Testing for mechanical low back and neck pain proved negative based on a McKenzie repeated movement protocol. Skin rolling assessment demonstrated normal connective tissue tension internally and externally. She presented with palpable rectal tension and tenderness in her left obturator internus and ischiococcygeus muscles. She had a negative Tinel test result just below the ischial spine for pudendal nerve sensitivity.

After completion of the physical examination, including appropriate psychosocial questionnaires, it was determined that Glenna was presenting with dominant central pain mechanisms as determined by her scores on the CSI and PCS and the lack of significant tissue involvement. It is interesting to note that two visits were required to complete the assessment and formalize a treatment plan. It is not always necessary or possible to gather all the data required within the first session.

**Phase 2: Desensitization**

Glenna’s treatment plan was developed by starting with pain biology education; our initial goal was to have Glenna re-conceptualize her understanding of pain. Glenna believed that she had pudendal nerve entrapment based on her own internet search. During the assessment, Glenna was instructed that her nervous system was doing a great job “defending” her despite the fact that her tailbone had been removed, her tissues had healed, and she demonstrated minimal tissue tightness in her pelvic floor. All these factors could not mechanically explain the burning in her feet and generalized spinal pain. Despite the lack of mechanical evidence, several visits were used to explore the tissue tension in her posterior pelvic floor because Glenna had a strong belief that resolving this tension would alleviate her symptoms. However, within several visits, it was obvious that her symptoms did not improve as a result of the manual therapy completed. She was given targeted stretches for the pelvic floor and obturator internus for several visits to coincide with this tissue-based trial of treatment. A short course of tissue-based treatment had significant value because Glenna strongly believed in a biomedical approach and determined that these tight muscles were the main cause of her pain, contributing to the sensitization of the pudendal nerve. It is important to meet patients where they are within their belief system to empathetically prove or disprove their beliefs. This approach was explained in the context of a broader biopsychosocial approach from the beginning, so that the transition to treating centrally mediated factors could be made smoothly.

After four visits, further discussion ensued because sustainable changes in her symptoms were not achieved; Glenna agreed to start targeting the nervous system more specifically in her therapeutic interventions. A simple, non-painful Qi Gong routine was started to target the sensorimotor cortex. The goal was to decrease cortically driven tension in her low back, pelvis, and legs. This lower Qi Gong routine was alternated with a breathing Qi Gong routine to decrease overall tension in the diaphragm and upper back. After several weeks of Qi Gong exercises, exercises designed by Eric Franklin and Moshe Feldenkrais were used to target cortical remapping of her feet. This provided a “safe” place to start because her nervous system was defending her pelvis more than her feet. Once the burning in her feet started to change, remapping exercises for sitting were specifically targeted. The Franklin and Feldenkrais strategies were used to help integrate novel imagery-based exercises to retrain the sensorimotor cortex in a safe and interesting way.

**Phase 4: Graded Exposure**

Within 10 visits, Glenna’s PCS score decreased to 22 out of 52; this represented a decrease from a severe to a moderate effect of catastrophizing and represented a significant improvement from her scores at assessment. Glenna could now sit for approximately 2 hours at a time, which represented a significant functional gain. At re-evaluation of her PCS score, hypervigilance was the highest subcategory score. Glenna was instructed to stop negatively predicting that sitting or intercourse were going to be painful before she even tried to complete these activities. She added positive affirmations into her daily routine to help with this hypervigilance, or “scanning,” of the environment for potential threat or trouble. On physical re-evaluation at week 10, the tension in her ischiococcygeus and obturator internus also had resolved.

**Phase 5: Supported Independence**

After 4 months of treatment (16 weekly visits), Glenna could sit for 8 hours during her work day. She was reminded that tissues normally become hypoxic after sitting for different lengths of time; she was instructed to incorporate normal movement into her
daily activities to break up prolonged sitting. These subtleties are often lost in persistent pain and hypervigilance and bear repeating to patients as they improve; patients often forget what “normal” is.

Once the cortical “guarding” of her pelvic area had decreased, Glenna’s dyspareunia also resolved. If it had not, this would be the time to integrate some graded exposure to vaginal dilators (accommodators) to help with reintegrating a “map” of safety with penetrative sexual activity. This approach would have been less about “stretching” the vaginal muscles (which were not tight) and would focus instead on remapping the sensorimotor cortex and developing a tolerance for penetration without the need to protect the vagina.

At her discharge visit (16th visit), Glenna scored 16 of 68 on the TSK, 8 of 52 on the PCS, and 4 on the “Anxiety” portion of the DASS. Glenna was re-evaluated every 3 months in the first year after her active physical therapy intervention to help her resolve any symptoms that might reoccur. At 1-year follow-up, Glenna continued to sit without difficulty and engaged in pain-free intercourse. At follow-up, her scores were 28 of 68 on the TSK, 1 of 52 on the PCS, and 0 on the “Anxiety” component of the DASS. Glenna had returned to spin class three times a week. Her urgency also resolved through the treatment process without further focus on her bladder or bladder hygiene.

This case study represents a shift in focus in which the physical therapist measures the biological, psychological, and social factors of a patient’s presentation from the beginning of the therapeutic interaction. Sound clinical reasoning guides the selection of intervention strategies, which are varied and rich in diversity.

SUMMARY

More research is needed to help select the best strategies to address the sensitive nervous system in all persistent pain states. It is reasonable to use evidence-based strategies such as cognitive behavioral therapy, pain biology education, mindfulness-based stress reduction, yoga, and imagery-based exercises, including graded motor imagery, framed within a biopsychosocial context.8,43,44,46,50,53 Physical therapists and other interested health professionals would benefit from further training in these techniques to successfully integrate these specific approaches into their clinical practice when treating patients within this framework. Providing care for women with sexual pain requires an interdisciplinary approach to address the complexities involved. Framing the evaluation and treatment plan within a biopsychosocial approach and measuring change with standardized assessment tools will help improve outcomes in this challenging population.

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