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The Cure That Lies Within
The Mind–Body Connection in Orthopaedics

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Most psychologists treat the mind as disembodied, a phenomenon with little or no connection to the physical body. Conversely most physicians treat the body with no regard to the mind or the emotions. But the body and mind are not separate, and we cannot treat one without the other.

—Candace Pert (2015)

The mind and the body are clearly intertwined in ways that are only now being discovered. In the orthopaedic world, injuries and diseases are often classified and described in a very organized, discrete fashion—The radius is fractured, the ACL or meniscus or rotator cuff is torn, the ankle is sprained, and/or the lumbar spine has a disc herniation. Although it is, in many ways, almost comforting to think about injuries or orthopaedic issues in this manner, what about the many patients who fail to fall into this classification? What about the thousands of patients with severe unexplained chronic pain or patients who just are not improving with the typical treatment algorithm. What about patients who present with multiple overlapping symptoms that do not fall into any of the classic diagnosis patterns? The mismatch between the actual health needs of typical patients and the standard acute medical response produces an immense waste of medical resources and incredible frustration for both the patient and the provider and creates a real risk that acute conditions will go untreated and become chronic. After more than a decade of traditional orthopaedic and musculoskeletal practice, its tremendous benefits as well as its limitations have become apparent. These limitations have sparked a search for integration of mind–body considerations to fill some of these gaps. Although this can prove to be quite challenging in today's healthcare world of maximizing volume and decreasing costs, it has proven to be an invaluable resource for both personal growth and patient and family satisfaction. The goals of this 2-part article are to dissect the relatively new concept of the mind–body connection in orthopaedics. The article aims to provide a framework that illustrates how the mind will predictably create objective observable phenomena in the body. The central focus of this framework is the role of the sympathetic nervous system and its effect on the chemistry, biomechanics, and appearance of various tissues in the body. Further identified are factors contributing to the aberrant emotional response as a means to empower practitioners and patients in recognizing the link between negative perception and observable symptoms. Our hope is to ultimately introduce a model of empowerment that when presented to a patient/family can produce a proactive response and, in turn, enhance current orthopaedic and pain management practices.

The modern medical model has provided tremendous advances in the overall health of human beings. The medical model typically emphasizes the use of a diagnostic symptom-oriented interview, extensive laboratory work, and often sophisticated imaging studies to identify a specific disease or conditions causing the patient's complaints (Cassell, 1997). Orthopaedic surgery successfully restores physical function and relieves pain in millions of Americans each year. Orthopaedic surgery for knee/hip osteoarthritis and lumbar spine conditions consistently make the top five list of surgical procedures in the United States by cost and volume. Despite the overwhelming overall success of orthopaedic surgery and procedures in this country, functional improvement and overall quality-of-life scores vary widely in published studies (Ayers, Franklin, & Ring, 2013). Overall functional improvement after orthopaedic surgery and procedures has been studied immensely, and although many theories and variables have been discovered, one common theme is that poor outcomes are highly correlated with poor emotional health and poor social support (Ayers et al, 2013). It is therefore well established that the emotional health of the patient can directly influence the outcome of many common orthopaedic surgical procedures.

The patient in mind–body medicine is understood as a totality of body, mind, and spirit, and interventions are directed at each of these aspects of the patient. The

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key premise of mind–body medicine is that a person's mental state can directly influence his or her physical health. The biopsychosocial model offers a multidimensional perspective by recognizing the impact of psychological and social factors (emotional states, beliefs, social factors, support, and behaviors) on the development and outcomes of illness and disease (Engel, 1977). In orthopaedics, the biopsychosocial health model has impacted the management of many musculoskeletal conditions. The power of the mind is, in fact, so strong that it can literally control the strength, function, and overall health of the physical body. Hippocrates (the earliest recorded physician and philosopher), often credited as the founder of Western medicine, was a holistic healer who looked at the human body as a whole rather than a collection of parts. A quick review of the writing of nearly all ancient healers and philosophers suggests that there was a universal agreement that the body cannot and should not be separated from the mind and the spirit. The human is far more than the sum of the body's physical parts, just as music is more than the sum of the instruments used to play it (Tick, 2014). Fast forward to today's healthcare system and the typical model used in most orthopaedic and other specialty practices, and it is so very easy to think and treat the human body as a machine—as a collection of individual parts. Perhaps, it was part personal experience and part working in insanely paced orthopaedic practices that really caused us to question the way we think about and treat injuries or illness. A highly functioning well-oiled machine requires unity between all of the parts to maximize overall function—stated quite simply—humans are complex and way more involved than a simple equation of parts.

We are taught to treat the whole patient, but, yet, we are taught at the same time to focus on an isolated issue—a "chief complaint"—the more focused and narrow one can make the diagnosis on paper/computer, the better feedback one will generally receive from other healthcare colleagues. Focused diagnoses, fast assessments, focused point of care, concise lightning speed dictations, and documentation—subspecialties within a specialty practice—it does not take long to gain solid competence in this and become almost robotic in the approach to most orthopaedic patients. Somewhere along that robotic continuum, the holistic approach to the patient is all but gone, until there are moments that make you realize just how critical the mind–body connection is. It might be the challenging patient who eludes a diagnosis despite extensive workup, the so-called "difficult patient" who often ends up lost or overwhelmed in today's complicated healthcare system. More often than not, this patient will actually have increased symptoms/pain and/or overall decreased health at the end of the workup than before any treatment was initiated. There will often be a significant increase in the level of anxiety or fear during this workup process that perpetuates disease and increased pain. The patient will be given diagnoses such as failed back syndrome, complex regional pain syndrome, chronic pain syndrome, fibromyalgia, or perhaps there will be a patient with severe injury or illness, with injuries involving multiple systems that defy all medical knowledge, and somehow has an outcome that is far better than predicted. Jon Kabat-Zinn, PhD, started a mind–body approach to medicine back in the late 1970s because he felt that many patients were "falling through the cracks." The cracks have now become large chasms according to Kabat-Zinn, and the dichotomy between the mind–body and the physical–body has become increasingly obvious in practice. Maintaining a balance between the two is a critical step to maintaining or obtaining "health." "Mindfulness is awareness that arises through paying attention, on purpose, in the present moment, non-judgementally," says Kabat-Zinn. "It's about knowing what is on your mind." Herbert Benson, MD, of the Mind-Body Institute describes a metaphor of a three-legged stool, "One leg is pharmaceuticals, another is surgery, and the third is what you can do for yourself. Mind-body medicine is strengthening the third leg, integrated with the other two legs" (Kabat-Zinn et al., 1985). We must take responsibility for what we feel—The notion that others can make us feel good or bad is untrue. Consciously or more frequently subconsciously, we choose how we feel at every single moment (Dusek & Benson, 2009). This choice, if taken from a patient, may enhance the distress associated with an already stressful injury. It is this distress that links the patient's perception of an injury and its management with the objectively observable physical phenomenon illustrated by the closed feedback loop given in Figure 1.

Background Information/What Is Mind–Body Medicine Exactly?

It is fascinating to do a quick literature search on mind–body medicine and applications of mind–body techniques in the healthcare system. It is even more intriguing to apply the search of mind–body medicine directly to orthopaedics—It does not take long to realize that there is a massive paucity of knowledge and research in this area. Mind–body medicine typically focuses on intervention strategies that are thought to promote health, such as meditation, yoga, biofeedback, tai chi, qi gone, cognitive-behavioral therapies, group support, relaxation, autogenic training, and spirituality (Wolsko, Eisenber, & Davis, 2004). Mind–body medicine also focuses directly on the interactions among the brain, mind, body, and behavior and the powerful ways in which emotional, mental, social, spiritual, and behavioral factors can directly affect health. A fundamental, yet often forgotten, part of integrating mind–body medicine into practice involves enhancing each person's individual capacity for self-knowledge and self-care. It is this part of mind–body medicine that really started to influence our different orthopaedic practices, from phone calls to preoperative visits to postoperative pain to everything in between. Connecting the knowledge of patient-centered care, and recognizing the power that the mind has to heal, opens the door to treating patients in a new and powerful way. When thinking of pain and disability in a different light, application of these principles traverses a huge range of pathoanatomical and regional diagnoses. With consideration of all of the factors that influence health, it is clear than many are within the direct control of the patient. "Most people do

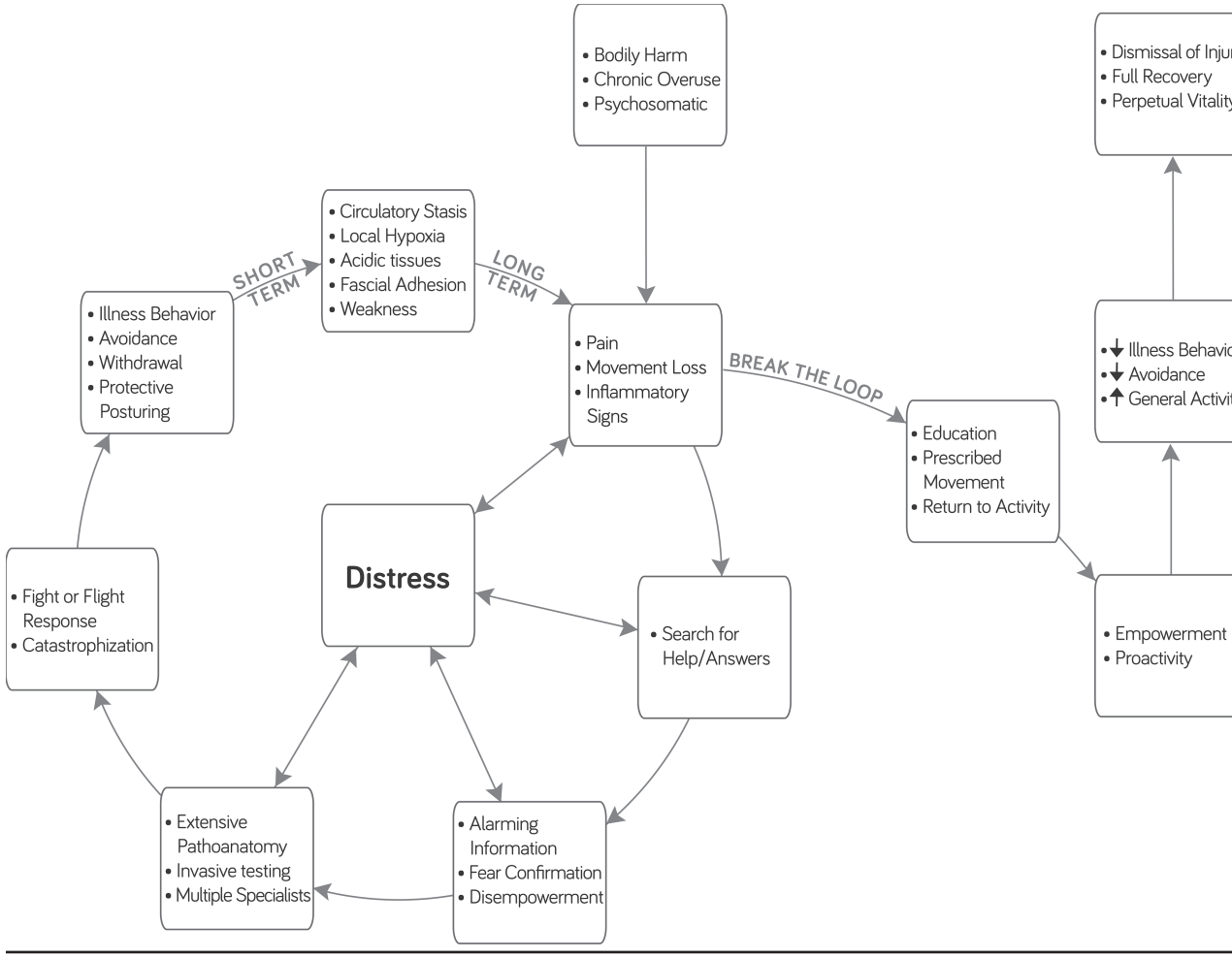

FIGURE 1. Adapted from Vlaeyen Fear Avoidance model (2000). Expanded by J. Hudson, MSPT, illustrating the many factors contributing to the fight-or-flight response, protective/avoidant behaviors and their consequences, and various tools that can be used to break the cycle of dysfunction and pain.

not realize that the mind constantly chatters, and that chatter winds up being the force that drives us much of the day in terms of what we do, what we react to, what we choose, and how we feel."

Our thoughts and feelings (emotions) influence the body via two kinds of mechanisms: the nervous system and the circulatory system. These are the pathways of communication between the brain and the rest of the body. The brain reaches directly into the body via the nervous system and allows it to send nerve impulse into the body's tissues and influence their behavior. The brain can thus directly affect the behavior of the immune system, with its nerve endings extending into the bone marrow, the thymus, the spleen, and the lymph nodes (Bachoura et al., 2014). It also reaches into the glands of the endocrine system, all the bones, muscles, all the internal organs, and even the walls of veins and arteries. It can influence the behavior of the heart, with its nerves penetrating the heart tissue, affecting heart rate, stroke volume, and other aspects of the heart's functioning. The entire body is literally "wired" or driven by the brain 24 hours a day. The brain also manufactures thousands of chemicals (neurotransmitters) and releases them into the bloodstream; these chemicals circulate throughout the body and influence the activity and behavior of all the body's tissues. Every emotional state or reaction carries its own biochemical and neuromuscular signature. However, the autonomic nervous system does not discriminate between the stress of daily life and that of an actual imminent threat. It sends stress signals throughout the body that can often overload our systems—causing illness, anxiety, depression, or physical pain (Vlaeyen, 2000). The brain could be described as the ultimate pharmacy, producing many more drugs than science has ever invented (Engel, 1980).

Many patients have initial difficulty grasping the full dynamics of the mind–body syndrome. It is one thing to accept the concept that the mind has great power over the body but quite another to internalize that knowledge and to understand it on a deeply personal basis. Even when patients can fully appreciate the central element of the equation—that is, that their mind that contains the root cause of their physical distress—they may continue to stumble over the secondary details, unable to accept the reality of the their own buried rage, and remain puzzled over the fact that their own mind can make decisions of which they are completely unaware (Sarno, 1999). There is a stigma attached to disorders relating in any way to psychology or the mind, and most people will prefer a diagnosis that can be treated with a

"quick fix" such as an injection, a medication, or even surgery. Emotions—and certainly emotional pain—are often not pleasant or easy for patients or providers to discuss, analyze, or understand. However, by bringing to consciousness both physical and mental expressions of stress, it is often possible to let go of the dysfunction that causes pain.

In tension myositis syndrome (TMS), the brain orders a reduction of blood flow to a specific part of the body, resulting in mild oxygen deprivation (hypoxia), which causes pain and other symptoms depending on what tissues have been oxygen deprived. The tissues that may be targeted by the brain include the muscles of the neck, shoulders, back, or buttocks; any spinal or peripheral nerve; and any tendon. The nature of the pain varies depending on the tissues involved—muscle, tendon, nerve—and can involve feelings of numbness and tingling and/or muscle weakness (Sarno, 1999). When treated appropriately and once the mind–body connection is recognized, patients will usually recover rapidly—the key principle is that the tissues involved are not damaged or injured in any way but only rendered temporarily dysfunctional. It is extremely common in today's healthcare system for a patient to present with pain and to undergo several invasive diagnostic imaging studies. In fact, it is quite commonplace to have practices order these studies before even seeing the patient in clinic. And so begins a course of confusion and fear to accompany the perception of illness where in truth the "abnormalities" of these studies may be unrelated to the pain itself. Patients will be told that they have disc abnormalities, stenosis, meniscal tears, rotator cuff pathology, or tears, and these findings will in reality have nothing to do with the symptoms that brought them in the door in the first place (see Figure 1). When we looked back at a typical week in practice, it started to become clear that a very large percentage of patients coming into our two very different clinics had some component of tension myositis. We will often give it a different diagnosis—muscle strain, tendonitis, musculoskeletal back pain, neck pain, shoulder pain, IT band tendinitis, piriformis syndrome, and the list could go on.

Case Study

M.K. is a 12-year-old-girl who was referred to the pediatric orthopaedic clinic for evaluation of right foot pain. She developed severe right foot pain approximately 2–3 weeks ago after a mild twisting injury in gymnastics. She is a Level VIII elite gymnast usually competing year-round and typically practices 20–25 hours a week. She recently started at a new school that is closer to her gym. She had been seen by her primary care physician (PCP) and had negative findings on radiographs of the foot and ankle. She described a burning, tingling sensation on the top of her foot and an inability to put weight on the right lower extremity. She was using an ace wrap splint and crutches, and her PCP had already obtained a magnetic resonance image of the foot and ankle for further evaluation. She presented to the orthopaedic clinic with both parents, her gymnastic coach, and athletic trainer from her new school. Her mother was extremely concerned about an upcoming gymnastic meet that was scheduled for late next week.

Physical examination revealed a well-appearing, alert, conversant 12-year-old girl in no acute distress. Height 154 cm, weight 73 lb. Focused foot examination revealed tenderness over the entire dorsum of the foot; maximum tenderness was over the second, third, and fourth metatarsals. She had pain to light touch; she could not stand or put any weight on the right lower extremity due to pain. There was no swelling, no erythema, no warmth, and no mass on examination. She had intact sensation and normal pulses; she had hypersensitivity to light touch over the dorsum of the foot. She stated that the area felt "hot" and that the splint and ace wrap seemed to worsen her pain.

Anteroposterior/lateral/oblique radiographs of the right foot showed negative findings. No fracture. Growth plates open. Salter–Harris I fracture could not be excluded. Alignment of the foot was normal. Both magnetic resonance images of right foot and ankle were normal. There was no fracture, no edema, or joint effusion; no evidence of infection or osteomyelitis. Tendons and ligaments were all normal. She was diagnosed with a possible occult (not seen radiographically) fracture in the foot or overuse injury and was sent home in a short leg cast and crutches. She presented 8 days later with worsening severe pain. Her pain was now described as a 10/10, and she was not able to attend school over the last 3 days. The cast was removed, and she now had findings that were concerning for reflex sympathetic dystrophy/complex regional pain syndrome. There was edema, pain to very light touch, and the foot was slightly cooler; she could not tolerate light touch; and the patient was in tears because she had missed her recent gymnastics competition. Radiographs were repeated and were again normal. The patient's mother was slightly angry stating that there must be something that was missed and that maybe a new magnetic resonance image would be useful for further evaluation. She had done some research online and had concerns over the persistent pain.

The patient was left out of the cast, and she started to attend aggressive physical therapy (PT) 3 days per week. She had strengthening of the foot and ankle, desensitization, and range of motion and stretching exercises to the right foot and ankle. She was able to put weight on the right lower extremity about a week after starting PT and resumed school at that time. She returned to the clinic about 2 months after starting PT and had a complete recovery. She had no pain, and her examination *was entirely normal*. She stated that losing the "fear" over her pain and her limitations freed her body to move more, do normal activities, and continue on with her life. She was no longer participating in gymnastics, but she had recently joined her school swim team and was very happy about the new friends she had already made. The patient's mother explained to me that M.K. had gone back to gymnastics once or twice last month, but that she then told her coaches and trainer that she did not want to compete anymore.

Cases such as that of M.K. are all too common in orthopaedic clinics—an acute distressful episode

compounded by external familial and social stresses and a lack of a distinct orthopaedic diagnosis. There is then additional exacerbation by an intense search for answers, immobilization, and withdrawal from sport and social activities. Several consultations and radiographs, with no definitive radiographs, further intensified the search as well as the perceived sense of urgency/fear. From the initial onset of the pain, M.K. was placed in a situation of pending loss with significant family and social implications. Her symptoms predictably worsened as the distress and fear associated with that loss became a central focus for both her and her support system (family, coaches, etc.). It was not until M.K. was placed in a situation that restored usage of her foot as if there was no injury that she was able to reengage in sport and social activities.

With close examination of patient, family, and practitioner interactions, as well as consideration of the gravity associated with repetitive diagnostics, it may be necessary to look beyond conventional medical thinking. Such an idea often presents a significant challenge for conventional orthopaedic or musculoskeletal providers and exposes a limitation that exists in both patients and providers. All of the accumulated knowledge utilized to care for and analyze our bodies has sidestepped the importance of emotions to our physical well-being. Addressing emotional issues as a means to manage actual physical symptoms can be perceived as diminishing to the patient as if to reject or judge the patient's complaint. The idea that a seemingly physical complaint is emotional in nature somehow implies illegitimacy of the issue as if it is made up and not a real observable phenomenon. However, once realized and recognized, it is often fascinating to see just how "real" psychosomatic pain is. The pain triggered by emotional factors is no less real—or potentially debilitating—than pain caused by a herniated disc or fracture (Scarf, 2004). It is incumbent upon both patients and providers to not only understand but also address the idea that human emotions can create a real observable physical phenomenon that plays a role in the restoration and maintenance of our health.

Once the diagnosis of TMS is suspected, and there is a willingness to consider the underlying psychosomatic diagnosis seriously, the treatment usually consists of four parts:

1. Teaching the patient to think psychologically rather than structurally about the origins of his or her pain (even though the pain is real, it is *not* an indication of damage or injury to the body).
2. Encourage the patient to be as active as possible and discontinue the safety behaviors aimed at protecting his or her "injury" and avoiding reinjury.
3. Encourage the patient to use as little medication as tolerated or a required to function as normal as possible. Place an emphasis on "normalization" rather than taking on role of "sick or injured."
4. Having the patient/family explore the underlying repressed or latent emotions that are often driving the pain. In today's crazy paced existence, it can often be helpful to have patients set aside just 10 minutes each to assess their emotional state.

Mechanisms exist by which the brain and central nervous system influence autonomic, immune, and endocrine system functioning, which is known to have a direct impact on health. Although it is easy to see that stress affects health and overall well-being, or that blood pressure rises when you're angry, cutting-edge research shows that the mind–body connection goes much deeper. Patients need to be active participants in their own healthcare and may actually be able to prevent disease or shorten its course or lessen pain by taking steps to manage their own psychological states. It is time that all healthcare practitioners recognize the fact that the mind—our thoughts and emotions—has a central impact on the body's overall functioning. As orthopaedic healthcare providers, we need to change our beliefs on disease—We need to emphasize that there are many variables that play a role in achieving complete biopsychosocial balance and overall wellness. We should recognize that many diseases, illnesses, and disorders do not fit into a simple classification scheme, and that we need to approach patients from a physical, psychological, social, and behavioral standpoint—We need to treat the whole patient. This discussion begins to take on the challenge of stepping outside the conventional medical thought process and isolate cognitive and behavioral changes, which could ultimately result in significant changes in pain and disability. Moving forward in Part 2 of this article, we will examine the fight or flight response that results from this phenomenon and provide insight into the neurological, biochemical, and mechanical considerations making for a viable component of any diagnostic or treatment protocol. The closed feedback loop in question can be perpetuated and broken at several stages along the continuum, and further discussion will provide means to facilitate the changes necessary to break the cycle. Finally, specific components of the myofascial connection will be analyzed and specific mind–body treatments that be utilized in orthopaedic practice will be discussed.

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