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Modern Pain Science and Alexander Technique: How Might Alexander Technique Reduce Pain?

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This article brings together research from the fields of pain science and Alexander Technique (AT) to investigate the mechanisms by which AT helps reduce pain. AT is a cognitive embodiment practice and a method for intentionally altering habitual postural behavior. Studies show that AT helps with various kinds of pain, although the mechanisms of pain reduction are currently not well understood. Advances in pain science may give insight into how this occurs. Modern interventions with efficacy for improving pain and function are consistent with active approaches within kinesiology. They also share similarities with AT and may have common mechanisms such as learning, mind–body engagement, normalization of sensorimotor function, improvement of psychological factors, and self-efficacy, as well as nonspecific treatment effects. AT likely has additional unique mechanisms, including normalization of muscle tone, neuronal excitability, and tissue loading, as well as alterations to body schema, attention redirection, and reduction in overall reactivity.

Keywords: embodiment, mindfulness, biopsychosocial, mind–body, mechanism, sensorimotor

Understanding the mechanisms of pain, how it affects motor behavior, and how to manage or alleviate pain through exercise, movement reeducation, and other interventions is a central focus of the field of kinesiology. Alexander Technique (AT) is one intervention that has received attention recently in kinesiology (Cacciatore et al., 2020; Woods et al., 2020), primarily for its potential to improve health and performance (Cacciatore et al., 2014; Cohen et al., 2015; Hamel et al., 2016; Johnson & Cohen, 2023; Kinsey et al., 2021; O'Neill et al., 2015; Woodman & Moore, 2012) and, more recently, in regard to pain. AT has been identified as one of the complementary and alternative approaches to movement education and important within the field of kinesiology for more fully comprehending the integrated nature of mind and body in human physical activity (Anderson, 2020). This perspective is consistent with modern pain researchers' view that pain is a whole-person experience that defies mental–physical categorization and that the mind–body dualism traditionally emphasized by Western medicine has limited utility for understanding pain (Crowley-Matoka et al., 2009).

Studies show that the AT helps with various kinds of musculoskeletal pain (Becker et al., 2021; Little et al., 2022; Little et al., 2008; MacPherson et al., 2015; Preece et al., 2016). Many people come to the AT to resolve a pain condition (Eldred et al., 2015). Two major randomized clinical trials showed reductions in long-term back and neck pain after a course of lessons, and one smaller trial showed reductions in chronic knee pain. These positive results occurred even though the AT does not typically target pain directly, instead focusing on improving neuromuscular patterns involved in activities of daily life.

But *how* and *why* does the AT reduce pain? This article aims to explore these questions. Pain is complex, and modern pain science has begun to shed light on various mechanisms behind pain and its alleviation. Recent advances in pain science may help us to understand ways that the AT can help to reduce pain.

Over the past few decades, there has been a substantial shift in the field of pain science that addresses many of the limitations of past understanding. To clarify the significance of this shift for the AT, we will review what has previously been the mainstream model of pain—referred to as the biomedical model—along with its shortcomings. We will then describe a contemporary model of pain that includes previously unrecognized factors and mechanisms of both acute and chronic pain.[1] Finally, we will theorize how the AT fits into this new framework.

Pain is incredibly diverse, arising from a wide range of conditions, from a paper cut to a broken bone to fibromyalgia to cancer, and there are multiple aspects of the pain experience, including sensation, emotion, and cognition. While there are broad ranges of both contributing factors and conditions, and each pain experience is highly individual, pain emerges from a common protective system. This system includes peripheral nerves, the spinal cord, and the brain—all within a person within an environment—and all of which participate in the perception of pain.

AT

AT is a cognitive embodiment practice and a method for intentionally self-regulating and altering habitual postural and motor behavior (Alexander, 1932). It is a nonexercise approach that involves nonjudgmental, nonreactive self-observation and monitoring. One of the aims of AT is to reduce reactivity during activity to promote efficient and healthy functioning and improved performance of tasks from the mundane to the complex. Using hands-on and/or verbal guidance combined with "sophisticated observation" (Tinbergen, 1973), a teacher assists the learner in developing proprioceptive, kinesthetic, and spatial awareness, in addition to awareness of unhelpful habitual reactions and neuromuscular patterns. Learners practice inhibitory and attentional skills to promote an overall organization of the body in relation to surrounding space

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that facilitates adaptability of muscle tone (Cohen et al., 2015). These skills are practiced in quiet posture and during exploration of the processes involved in attaining a simple goal, such as standing from a chair, and then practiced in activities of daily life. Instruction also typically includes basic anatomy.

AT has been shown to reduce pain (Becker et al., 2021; Little et al., 2008, 2022; MacPherson et al., 2015; Preece et al., 2016) and improve dynamic modulation of postural tone (Becker et al., 2021; Cacciatore et al., 2011; Cohen et al., 2015), postural sway (Cohen & Hocketstaller, 2023; Gleeson et al., 2015), and movement (Cacciatore et al., 2014; Cohen et al., 2015; Davies, 2020; Glover et al., 2018; Hamel et al., 2016; Johnson & Cohen, 2023; O'Neill et al., 2015; Preece et al., 2016). AT has also been found to affect psychological outcomes such as anxiety, executive inhibition, self-efficacy, self-management, psychological well-being, and a sense of mind–body integration (Davies, 2020; Gross et al., 2022; Hanefeld et al., 2021; Kinsey et al., 2021; Klein et al., 2014; McClean et al., 2015; Woodman et al., 2018).

The Biomedical Model and Its Shortcomings

The biomedical model posits that pain is a direct indication of tissue damage and that the underlying pathology must be treated to reduce pain. This idea appeals to our common sense—pain feels like something is damaged. In fact, mainstream Western medicine for centuries has presumed that there is an underlying anatomical cause to pain and that this relationship is proportional: more pain means more damage. This presumption also implies that pain without evidence of an anatomical source is not "real," but rather imagined or caused by psychological problems. Additionally, it ignores evidence of the involvement of the nervous system, including the brain, in the experience of pain. This perspective, while deeply ingrained in today's approaches to pain, is limited in its utility for understanding and addressing pain (Cohen & Quintner, 2012).

To understand these limitations, let us consider some familiar examples. Many of us may have experienced a minor—yet incredibly painful—injury, such as a stubbed toe or tension headache. In these cases, the degree of damage is far out of proportion with the severity of the pain. In other conditions such as chronic back pain (Hartvigsen et al., 2018), fibromyalgia (Pinto et al., 2023), or chronic regional pain syndrome (Marinus et al., 2011), severe pain may occur without any identifiable structural pathology. On the other hand, athletes injured on the field may only notice the injury after the game is over. Also, people with significant spinal abnormalities such as disc degeneration or hernia are often pain-free or show only weak pain correlation with the degree of abnormality (Brinjikji et al., 2015). Likewise with rotator cuff tears, a large percentage of people with tears have no pain (Sher et al., 1995). In fact, recent research has found that tissue damage is not predictive of pain severity. Pain is such a poor indicator of the state of tissues that leading medical bodies such as the American College of Radiology (American College of Radiology, 2024; Hall et al., 2021) and National Institute for Health and Care Excellence (National Institute for Health and Care Excellence, 2016) now recommend against early scans for people with back pain in the absence of red flags.

A Modern Understanding of Pain

There is now indisputable evidence that pain is not an unambiguous consequence of tissue damage but rather a multifactorial and multidimensional experience. In addition to physical sensation, the experience of pain entails affective, cognitive, and behavioral aspects. For example, pain involves unpleasant feelings, interpretations, and protection of a body part. When studying pain, researchers point not just to pain intensity but also to pain-related fear and anxiety, mood disruptions, interference by pain in life activities, and functioning. Research in recent decades has also revealed previously unrecognized factors besides tissue damage that influence pain (Raja et al., 2020). Biological, psychological, and social factors interact with lived experience to create a unique pain experience for every individual and every incident (Karunamuni et al., 2021). While information from the body is of course important, the brain uses all the information it has available to determine whether the person or body part is in danger and in need of protection. Information from the body can also be amplified or driven by nervous system processes that will be discussed below.

Pain as Protection

Many researchers concur that pain can be better understood when viewed as one of the body's protective systems (Moseley, 2007; Wallwork et al., 2016). Pain promotes a variety of protective behaviors to address threats to bodily integrity and increase the chances of survival, like withdrawing of a limb, guarding, resting, and seeking help. Protective responses include varying degrees of sensitization of the peripheral and central nervous systems, motor changes, and psychosocial behavior, which themselves influence the experience of pain. The evolutionary advantage of pain is lost, however, when pain endures for long periods of time. When this happens, there is much more at play than tissue damage, and the relationship between tissue damage and pain becomes more tenuous.

Nociception

Nociception refers to processing within the nervous system of input from a stimulus that damages, or has the immediate potential to damage, the body. Nociception is occurring all the time and is neither necessary nor sufficient for pain, meaning that nociceptive input is merely one factor that may contribute to the experience of pain (Wall, 1979). That experience can be modified at multiple levels of the nervous system (Grace et al., 2014).

Sensitization

Sensitization is one mechanism by which increased pain occurs in the absence of tissue damage, inflammation, or neural lesion (Woolf, 2011). Sensitization refers to a reduced pain threshold or a magnified response of the nervous system to stimuli and heightened perception of pain. This type of plasticity involves numerous mechanisms, including increased responsiveness of peripheral nociceptors and spinal cord neurons, expanded receptive field of nociceptive neurons in the spinal cord, recruitment of increasing numbers of spinal cord neurons that encode both noxious and innocuous stimuli (Coghill, 2020), and altered facilitation and inhibition of synaptic transmission (Basbaum et al., 2009).

Sensitization adds extra protection by changing the way signals are processed in the nervous system. For example, a sunburn increases the sensitivity of the nervous system such that a light brushing of the skin or a shower can be painful despite lack of harm. The heightened sensitivity contributes to preventing future potentially damaging behavior. While the increased tenderness from a sunburn resolves in a matter of days, sustained changes throughout the nervous system can occur and become an important contributor to persistent pain.

Sensitivity can become problematic when it becomes overly protective (Luo et al., 2014), as in the case of osteoarthritis or chronic back pain. In chronic pain conditions in particular, increased sensitivity can act to perpetuate pain independent of the state of the tissues (Basbaum et al., 2009). Osteoarthritis is an example of a condition in which a sensitized nervous system contributes to joint pain. Evidence for this sensitization includes greater sensitivity to pain in areas remote from the painful joint as well as the weak correlation between structural damage and pain (Gwilym et al., 2009; Horga et al., 2020; Lluch et al., 2014). Sensitization may also contribute to, or become a driver of, other pain conditions such as back pain, temporomandibular joint disorder, headaches, and phantom limb pain even without corresponding damage in the tissues (Giummarra et al., 2007; Woolf, 2011).

Sensorimotor Disruptions

A wide range of sensorimotor disruptions are also associated with chronic pain. These include changes in the brain's representations of body parts and other widespread changes in the brain (Moseley & Flor, 2012). Changes occur, for example, in relation to heightened attention (Clauwaert et al., 2018), inhibition (Staud, 2012), and body schema (Bray & Moseley, 2011; Martinez et al., 2018; Moseley & Flor, 2012). For example, a reorganized lumbar spine representation in brain regions involved in sensory processing and motor control has been observed in people with low back pain (Goossens et al., 2018). Altered postural control and impaired balance have also been observed in people with chronic neck pain (Ruhe et al., 2011). People with persistent low back pain exhibit reduced lumbar proprioception and have increased postural sway. Altered position sense may contribute to development and perpetuation of back pain (Goossens et al., 2018). Likewise, people with fibromyalgia have been shown to have postural control deficits (Trevisan et al., 2017), which have been linked to impaired cervical joint position sense (Reddy et al., 2022).

It is also clear that pain is associated with substantial and diverse changes in the distribution of postural muscle activity and movement coordination (Hodges & Tucker, 2011; van Dieen et al., 2019). One such tendency is an overactivation of superficial muscles with concurrent deactivation of deeper muscles in people with chronic neck (Jull & Falla, 2016; Jull et al., 2008) and back pain (Hodges & Danneels, 2019; van Dieen et al., 2019). However, in general, the relationship between pain and motor control has been tricky to study because of the highly individual nature of motor changes to pain (Hodges & Danneels, 2019; van Dieen et al., 2019).

While much remains to be learned about the relationship between brain changes and pain, there is now growing evidence that sensorimotor disruptions actually predict or even contribute to chronic pain (Alshehri et al., 2024; Brumagne et al., 2019; Tanaka et al., 2021). There is also some evidence that pain-related plasticity can be reversed. For example, cognitive behavioral therapy for chronic pain (Lazaridou et al., 2017; Seminowicz et al., 2013) and hip arthroplasty for painful hip osteoarthritis (Gwilym et al., 2010) have both been shown to reverse brain changes. Moreover, these changes were correlated with improvement in people's pain. This supports the idea that plasticity plays a role in perpetuating pain.

Psychosocial Factors

There is substantial evidence that psychological and social factors are closely linked to pain (Linton & Shaw, 2011; Michaelides & Zis, 2019). For example, people with posttraumatic stress disorder or significant adverse experiences in childhood are at greater risk of increased pain sensitivity and chronic pain (Meints & Edwards, 2018). Likewise, distress, fear, expectations, and beliefs about back pain strongly influence pain intensity and the likelihood of developing back pain-related disability (Hartvigsen et al., 2018). In fact, emotions influence processing of noxious stimuli (such as injury or temperature extremes), reflex withdrawal from a noxious stimulus, and pain perception (Rhudy et al., 2005). Also, the contextual factors around an injury such as a hostile work environment, poor sleep, or concurrent health issues may heighten a sense of threat and increase sensitivity to pain (Moseley & Arntz, 2007; Timmers et al., 2019). Contextual factors surrounding a treatment, including practitioners' negative beliefs, can induce a nocebo effect (i.e., physiological changes brought about by expectations of negative outcomes; Rossettini et al., 2018). The social context within which an injury occurs and sociodemographic factors such as education level and minority status have also been shown to influence pain and the transition to chronic pain (Booher, 2019; Borsook et al., 2018). Even other people's responses to the pain can influence it (Nees et al., 2022). Often, these threatening contextual factors are broad and outside of conscious awareness. Essentially, anything that can influence the brain's evaluation of threat can influence pain (Moseley & Flor, 2012).

Novel Interventions

Overwhelming evidence of nervous system changes and psychosocial influences on pain, as well as reconceptualization of pain as protective rather than indicative of damage, has led to a shift in the understanding and treatment of pain. Newer interventions for pain and related disability based on this shift take an active approach toward treatment, including behavior change and sensorimotor retraining, a more effective approach that is consistent with AT and other large-scale approaches in kinesiology to promote health, such as the American College of Sports Medicine's "Exercise is Medicine" campaign (Thompson et al., 2020).

One new intervention for chronic disabling low back pain is cognitive functional therapy, which consists of first identifying the many factors contributing to each individual's pain and disability, including movement patterns, posture, cognition, emotion, behavior, social and lifestyle related aspects (Kent et al., 2023). Identification of individual factors is followed by tailored education about pain. Finally, individuals learn relaxation techniques and active strategies for gradually changing thoughts, posture, movement, and lifestyle habits. This approach is designed to engage the individual actively in management and recovery rather than promoting a passive attitude toward treatment, as is typical of a biomedical approach. A recent large trial (Kent et al., 2023) showed that cognitive functional therapy led to strikingly large and sustained reductions in pain and disability, in contrast with older, more conventional interventions for chronic musculoskeletal pain, which typically show short-term, but not long-term, reductions in pain. These results are similar to those found by the large study on AT for chronic back pain (Little et al., 2008), which also found a substantial sustained reduction in pain and disability.

Another new intervention involves graded sensorimotor retraining that addresses the altered pain processing that disrupts sensorimotor ability (Bagg et al., 2022). This psychophysical intervention was designed to alter how people think about their body in pain, how they process sensory information, and how they move. After learning about pain, participants engaged in various activities involving proprioception and active movement, including tactile acuity tasks, observation and mental rehearsal of different body configurations, and a gradual progression to physical movement. These activities are intended to reestablish nonprotective patterns of neural activity and movement (Wallwork et al., 2016). A recent large trial found that graded sensorimotor training led to modest and sustained improvements in low back pain (Bagg et al., 2022).

As a result of the new understanding of how closely linked psychological experience is to pain, the mind is now considered a central tool to address pain. This is in stark contrast to the biomedical model and to simple stretching and strengthening based approaches. It also paves the way for interventions that incorporate a mental component, like the AT.

How Might Alexander Technique Reduce Pain?

Advances in pain science may shed light on how the AT acts to reduce pain. AT mechanisms may overlap with the mechanisms of newer interventions that are supported by modern pain science, as well as many of the nonspecific effects of older and newer interventions. In addition, there may also be unique mechanisms specific to the AT that reduce pain. Below, we provide descriptions of some aspects of an AT lesson that may play a role in the pain reduction observed with AT.

Specific Effects

Touch

In addition to nonspecific benefits of touch, touch in the AT lesson is also specifically used both to assess and to invite change in the postural state of the student. AT touch draws attention to a region while encouraging nonreactivity, thereby providing feedback that promotes changes in tension. For example, a teacher might touch a student's neck and back, helping to redistribute postural tone by encouraging lengthening of the student's spine or widening of the back, depending on the student's presentation. A teacher might also gently move a student's head to promote an adaptive state of tone. Rather than imposing a particular position, AT touch invites adaptive postural tone. This is important because of the highly individual nature of posture and motor control in relation to pain (van Dieen et al., 2019).

Mind–Body Engagement

A teacher will use verbal and other means to engage the student's mind in relation to their body and space. The concept of mind–body unity behind this guidance is similar to the unified person perspective advocated by leading pain researchers (Moseley, 2019). The teacher may ask the student to notice specific parts of their body, for example their neck or feet, without judgment or attempt to change. This kind of accepting attitude has been shown to be associated with movement improvements and other pain-related outcomes (Hughes et al., 2017; Vowles et al., 2007; Wetherell et al., 2011).

The teacher may then cue the student to embody qualities such as fluidity, support, or freedom or to encourage a certain spatial relationship within or between body segments, such as the length and width of their back. Such embodied cues are referred to by AT practitioners as "directing." For example, a cue such as "let the back lengthen and widen" may encourage a student to reimagine the configuration of the back, promoting changes in muscle tone and overall postural state. The student is specifically asked to "think" the cue and not to "do" it, consistent with the idea that AT promotes remapping rather than repositioning. There is evidence that promoting embodiment of particular physical characteristics like size and strength is beneficial for pain. For example, one pilot study showed that embodiment of a strong, wide back led to a reduction in back pain (Nishigami et al., 2019). In a study of symptomatic knee osteoarthritis, illusory resizing of the knee led to significant reductions in knee pain (Stanton et al., 2018).

AT directing, guided by feedback from a teacher, may engage and normalize body schema (Cacciatore et al., 2020). This procedure may be similar to interventions involving tactile acuity training and mental judgments of observed body positions, which are also thought to address disturbed body schema (Bray & Moseley, 2011; Moseley & Flor, 2012). Such tasks could act to reengage and recruit disengaged body regions that have "dropped out" of working body schema with the presence of pain (Moseley & Flor, 2012). AT lessons often involve directing while performing a functional task such as walking or bending. This way of performing the task integrates multiple senses and thus may improve sensorimotor disruptions, proprioception, and spatial acuity—all of which are relevant to pain (Moseley & Flor, 2012; Wallwork et al., 2016).

Changes in Postural Tone

Postural tone refers to background muscle activity across body regions that enables both stability and movement in gravity. Some studies suggest that AT influences the distribution of postural tone. For example, one study found that AT teachers have greater adaptivity in their axial muscles than age-matched healthy controls (Cacciatore et al., 2011). Another study showed that even a few minutes of instruction in an AT-based approach to posture can increase this adaptivity (Cohen et al., 2015).

AT lessons often involve activities or procedures that can be viewed as experiments. These "experiments" allow the teacher and the student to observe how the student's mental changes affect their postural tone and the activity itself. For instance, it is common for a teacher to guide a student from sitting to standing in a slow way that highlights the difficult-to-prevent tendency to use momentum and lurch forward at seat-off. The teacher helps the student alter their postural state, for instance, while the student is seated, through encouraging them to release tension and mentally engage with the configuration of their body. Any resulting changes in effort and smoothness can then be observed as the student rises from the chair. One study found that AT teachers are able to do this task more smoothly than age-matched controls; biomechanical modeling indicated that the difference could be explained by the greater adaptability of the AT teachers' postural tone (Cacciatore et al., 2014).

Changes in postural state brought about by AT are likely to include changes in the excitability of neural circuits that regulate tone (Cacciatore et al., 2011; Gurfinkel et al., 2006). These same circuits have been hypothesized to underlie pain-related motor disruption (Hodges & Tucker, 2011). Changes in postural state may have various specific effects that relate to pain, including (a) changing the loading on painful regions, (b) normalizing sensorimotor function (Meier et al., 2019), (c) changes in excitability (Hodges & Smeets, 2015), and (d) reducing protection from pain (Hodges & Tucker, 2011). These changes in postural tone and stiffness observed following AT lessons could also account for reported reductions in knee and neck pain (Becker et al., 2021;

Preece et al., 2016), perhaps via changes in excitability. In particular, the lower stiffness and higher adaptivity of muscle tone from the AT (Cacciatore et al., 2011) could act to decrease prolonged static or inappropriate tissue loading (Hodges & Smeets, 2015).

Self-Efficacy and Overcoming Fear Avoidance

AT's influence on pain is likely mediated by improvements in self-efficacy and reductions in fear avoidance. A large, randomized, controlled trial on AT for back pain (Alexander technique lessons, exercise, and massage) found significant reductions in disability and fear avoidance (Little et al., 2008). Development of certain cognitive skills (Laura & Jones, 2020; Williams et al., 2020) can reduce fear and anxiety (Kinsey et al., 2021; Klein et al., 2014) and contribute to a greater sense of control over pain, all of which are strongly correlated with pain reduction (Edwards et al., 2016). Through AT lessons, the student learns not to fear previously feared movements (Kinsey et al., 2021); disconfirmation of the expectation of pain or injury enhances learning that leads to long-term pain reduction (Kube et al., 2022). For example, achieving a slow, smooth sit-to-stand movement without lurching provides the student with the opportunity to reappraise the degree of effort required and to correct inaccurate predictions of harm when performing the movement (Vlaeyen & Linton, 2000).

Improved movement performance and increased confidence (Kinsey et al., 2021) also lead to an increased sense of self-efficacy (the belief in one's ability to engage in activities despite pain). Self-efficacy is strongly correlated with pain reduction and reduced risk of disability due to pain (Asghari & Nicholas, 2001). Studies on the AT for neck pain found that increased self-efficacy after AT lessons was linked to reduced neck pain (Becker et al., 2021; Woodman et al., 2018).

Attention and Reactivity

There may be other ways in which the AT reduces pain, related to attention and reactivity. For example, AT teachers often instruct a student to attend more broadly than to the site of their pain. Aside from distraction, this manner of intentionally redirecting attention and expanding awareness is relevant to pain processing (Torta et al., 2017). Movement coaching methods that direct attention toward nonprovocative aspects of motion by prioritizing other senses have been shown to reduce pain (Wand et al., 2023). Brain imaging shows that diverting attention to cognitive tasks unrelated to pain activates pain inhibitory systems (Torta et al., 2017). In general, mindful awareness is associated with lower pain and reactivity (Wand et al., 2023; Zeidan et al., 2012). Finally, the AT could reduce heightened pain sensitivity by decreasing overall reactivity. There is some evidence that the AT improves executive inhibition (Gross et al., 2022), and this regulation of general reactivity may act to decrease pain sensitivity (Bjekic et al., 2018).

Other Psychological Effects

Balance confidence is negatively correlated with pain (Stubbs et al., 2014), as is a sense of safety (Zillig et al., 2023). AT may promote feelings of safety through improvements in balance (Batson & Barker, 2008; Cacciatore et al., 2005; Cohen et al., 2020; Cohen & Hocketstaller, 2023), as well as an increased sense of control (Kinsey et al., 2021), empowerment, and self-care skills (Glover et al., 2018; Kinsey et al., 2021; McClean et al., 2015). In essence, these types of outcomes are hypothesized to reduce overprotection (Caneiro et al., 2022). Other studies of the AT have found that it increases psychological well-being, optimism, and confidence. Furthermore, a mixed methods study found that after AT lessons, individuals changed their relationship with pain and their pain management (McClean et al., 2015). All these psychological factors are known to positively influence pain.

Nonspecific Effects

One of the central features of this individualized interaction is the use of touch by the teacher. Earlier, we addressed some specific aspects of AT touch that may contribute to reducing pain. In addition, touch has many nonspecific effects that are beneficial for pain. For example, it can suppress pain-related sensory input (Mancini et al., 2015) while promoting reorganization of body representations in the brain (Flor et al., 2001), feelings of safety and relaxation, and a positive therapeutic relationship (Geri et al., 2019; Jones & Glover, 2014).

There are other likely nonspecific contributors to AT's reported benefits. For instance, the fact that AT is taught by a highly trained teacher creates expectations of improvement, which can improve pain outcomes (Atlas & Wager, 2012; Malfliet et al., 2019). AT is taught in an individualized manner with importance placed on an empathetic, caring relationship between teacher and student. This kind of individualized care has been shown to be important when addressing persistent pain (Lin et al., 2020; Wernli et al., 2022), and a therapeutic relationship characterized by empathy and positive communication enhances outcomes (Dorflinger et al., 2013; Ferreira et al., 2013). While approach and content vary widely, a teacher generally provides education on the principles of AT, including awareness of habitual physical and mental patterns, whole-body organization, and the psychomotor processes involved in changing these. Education in and of itself can be therapeutic (Cook, 2013), particularly when combined with movement (Wallis & Taylor, 2011). The student is also actively involved in AT lessons, initially through both the decision to take lessons even though they are generally not covered by health insurance and later through engagement in exploration of posture, movement, and thought processes. While passive approaches in which something is done to the individual tend to have poorer outcomes (Covic et al., 2000), active participation that depends on engagement by the individual has been demonstrated to be beneficial long-term for pain-related improvements (Blyth et al., 2005; Nicholas et al., 2012).

Future Research

Further research to understand the multisystem mechanisms by which AT reduces pain will help practitioners optimize pain care and predict which individuals or subgroups are likely to benefit from AT. Research on AT is challenging due to heterogeneity of AT teaching, the inherent difficulty of studying postural mechanisms, and difficulties in obtaining funding. Because trials of participative mind–body therapies such as AT face unique challenges to avoid bias, measures must be taken to increase the rigor of studies, including clear protocols, appropriate comparison interventions to distinguish nonspecific effects and limit confounding effects, and standardization of reporting (Mehling et al., 2005). We propose that postural tone and neural excitability are fruitful areas of investigation into the relationship between AT and pain. We encourage future researchers to investigate pain-related outcomes using standardized, validated self-report tools including pressure point threshold, self-efficacy, fear of movement, anxiety, and depression; objective tests of proprioceptive acuity; function-related outcomes such as sleep and sit to stand; and tests of central nervous system-related mechanisms using conditioned pain modulation, brain imaging, and laterality judgments.

Conclusion

While there is evidence that Alexander Technique (AT) reduces pain, the mechanisms by which this occurs are currently not well understood. However, advances in pain science may shed light on how AT reduces pain. We have seen that there is little direct correlation between tissue damage and pain and that pain is the action of a protective system that includes neural, biological, and psychological mechanisms. Chronic pain is closely intertwined with the plasticity of these systems. Modern interventions stemming from the new understandings around pain show increased efficacy for improving pain and function compared with older interventions based on a simple biomechanical model. Many of these new interventions share similarities with AT and are relevant to the field of kinesiology, with its aim of understanding the mechanisms underlying movement in relation to pain and active approach to treatment. They may also have common mechanisms, such as learning, normalization of sensorimotor function, and improvement of psychological factors. AT likely has other unique mechanisms that relate to its pedagogy, including sensorimotor changes related to normalizing muscle tone, neuronal excitability, and tissue loading, as well as alterations to body schema and reducing overall reactivity.

Notes

1. Chronic pain is usually defined as pain lasting longer than 3 months.

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