Integrating Alexander Technique into Treatment of Adolescent Idiopathic Scoliosis to Improve Patient Quality of Life

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INTEGRATING ALEXANDER TECHNIQUE INTO TREATMENT OF ADOLESCENT IDIOPATHIC SCOLIOSIS TO IMPROVE PATIENT QUALITY OF LIFE

by

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SUBMITTED TO THE W.M. KECK SCIENCE DEPARTMENT OF CLAREMONT McKENNA, PITZER, AND SCRIPPS COLLEGES AND TO SCRIPPS COLLEGE IN PARTIAL FULFILLMENT OF THE DEGREE OF BACHELOR OF ARTS

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ABSTRACT

The following thesis posits training in the Alexander Technique as a possible solution to address the comorbidities of poor body image and reduced feelings of efficacy in patients treated for adolescent idiopathic scoliosis (AIS). Both literature and personal accounts of AIS highlight that current conservative methods of treating AIS offered by the Western medical sphere, including observation, bracing, and physical therapy, do not adequately address, and may actually exacerbate, negative mental health symptoms. Patients are often represented as their external orthopedic diagnosis and receive limited emotional guidance in exploring their internal feelings about their body and its capabilities. Alexander Technique offers an approach to body work in which the mind and body are undeniably interrelated; therefore, it could combat the negative mental health symptoms brought on by the physical diagnosis and treatment of AIS. To test this hypothesis, an experiment is proposed to compare the holistic health outcomes of observation, bracing, and Alexander Technique in patients with AIS.
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INTRODUCTION

This thesis was inspired by my own personal journey with adolescent idiopathic scoliosis (AIS). Diagnosed when I was 12-years-old and treated using overnight bracing and physical therapy when I was 13, I became self-conscious of my appearance and functionality. My negative thoughts about my spine manifested in my body as a decreased range of motion, and my limited mobility perpetuated a poor body image, creating a self-fulfilling prophecy of reduced physical and mental health. It was not until taking my first somatics course at Scripps when I was 20 that this adverse relationship to my body and spine began to heal. Curious if other AIS patients had similar experiences, I turned to the literature to find that indeed poor body image and low self-efficacy often accompany AIS diagnosis and treatment. Like myself, most patients are diagnosed with AIS during the onset of puberty, coinciding with the developmental period when peer acceptance, body image, and autonomy are of increasing importance (Carli-Mills, 2018; Misterska, Glowacki, Latuszewa, & Adamczyk, 2013; Reichel & Schanz, 2003).

Although the comorbidity of AIS and poor mental health has been acknowledged many times, few solutions have been offered that sufficiently integrate the physical, mental, and emotional aspects of AIS. The dualistic nature of Western medicine manufactures treatments, such as bracing, that sacrifice mental health for physical health. “Successful” AIS treatment is often defined by the progression or reduction in scoliotic curve severity, emphasizing the physical presentation of the disorder but failing to account for the mental and emotional domains of health that affect patients’ quality of life.
Somatics is a field of study that offers a holistic approach to body work that could address the issues of body image and self-efficacy brought on by conservative (i.e. non-surgical) methods of AIS treatment. At the core of somatics is the idea that the mind and body exist as one cohesive unit. Physical wellness affects mental wellness and vice versa. Somatics also encourages patient engagement and education about their body and treatment, validating people’s lived experiences and boosting self-efficacy (Cordova-Caddes, 2019; Lynggaard, Nielsen, Zwisler, Taylor, & May, 2017). There are several distinct modalities that fall under the umbrella of somatics, one of which is Alexander Technique (AT). AT seems particularly appropriate to integrate into AIS treatment as it yields the primary benefits present in all somatic disciplines through key principles and a general technique that can be integrated into one’s everyday life. The purpose of this study is to expose the shortcomings of conservative AIS treatment and to present the field of somatics, and specifically AT, as a holistic approach to wellness that may bridge the existing gaps between mental and physical healthcare in order to improve quality of life in AIS patients.
ADOLESCENT IDIOPATHIC SCOLIOSIS AND WESTERN MEDICINE

*Diagnosis of adolescent idiopathic scoliosis and treatment referrals*

Scoliosis refers to a “three-dimensional spinal deformity” that displays lateral curvature in the coronal plane (Bettany-Saltikov, Parent, Romano, Villagrasa, & Negrini, 2014, p. 111; Kalichman, Kendelker, & Bezalel, 2016). Most scoliotic curves are found in the thoracic (vertebrae T1-T12) and lumbar (vertebrae L1-L5) regions of the spine. The exact location and concavity of the curve determines if scoliosis is considered thoracic, lumbar, thoraco-lumbar, or combined. Figure 1 shows how the different types of scoliosis present.

![Types of Scoliosis](image_url)

**Figure 1.** Types of scoliotic curves in the thoracic and lumbar spine. Thoracic scoliosis occurs in vertebrae T1-T12, lumbar scoliosis occurs in vertebrae L1-L5, thoraco-lumbar scoliosis describes a continuous curve that occurs in both thoracic and lumbar vertebrae, and combined scoliosis refers to two curves occurring in different parts of the spine. Combined scoliosis is characterized by a primary curve in one direction and a compensatory curve in the counter direction.

Image courtesy of Eidelson, 2019
A patient is typically diagnosed with scoliosis if a curve in the coronal plane has a Cobb angle of 10º or more (Scoliosis Research Society, 2019). In 1948, Dr. John Cobb developed the Cobb method to determine the magnitude of spinal curvature using an X-ray image (Weerakkody & Thuaimer, 2019). A Cobb angle is calculated by drawing lines along the endplates of the vertebrae that are most tilted towards each other, known as the “terminal vertebrae” (Weerakkody & Thuaimer, 2019, Figure 2a). The angle made by the lines’ intersection is the Cobb angle. If the curvature is not severe enough that the lines will intersect, two additional lines are drawn extending perpendicularly from the original lines, and the angle at the intersection of these secondary lines is the Cobb angle (Figure 2b). The Cobb method applied to X-ray images is shown in Figure 2 (Weerakkody & Thuaimer, 2019).

Figure 2. *The Cobb method for determining the magnitude of spinal curvature.* Angle a demonstrates the Cobb method for more severe curves in which the primary lines intersect. Angle b shows the Cobb method for lesser curves in which the primary lines do not intersect.

Image courtesy of Weerakkody & Thauimer, 2019
The most common type of scoliosis is adolescent idiopathic scoliosis (AIS), comprising about 80% of all diagnosed cases (Kalichman et al., 2016; Talić, Ostojić, Bursač, Nožica-Radulović, & Stevanović-Papić, 2016). AIS is the most common spinal abnormality among youth, appearing in approximately two to three percent of adolescents in the U.S. (National Institutes of Health, 2013). Larger Cobb angles and progressive curves that merit treatment are far more frequent in adolescent females than males (Kalichman et al., 2016; Talić et al., 2016).

Progressive curves are those predicted to grow in magnitude based on skeletal maturity as determined by the Risser grading system (Scoliosis Research Society, 2019; Figure 3). A Risser score of zero to three indicates that a patient is still growing and predicts progressive scoliosis that will likely be referred for brace treatment to halt curve growth. A Risser score of four to five indicates that a patient has reached skeletal maturity and will therefore not be considered for brace treatment because a curve is not expected to increase in magnitude once a patient has stopped growing (Scoliosis Research Society, 2019). Figure 3 shows the different Risser scores that would be given based on bone appearance and density in an X-ray. Higher bone density on an X-ray is associated with more mature bone and merits a higher Risser score.

**Figure 3.** Risser grading system applied to the pelvis. The Risser scale is used to determine skeletal maturity. A score of 0-3 indicates that the patient is still growing. A score of 4-5 indicates that the patient is no longer growing. (Scoliosis Research Society, 2019).

Radiograph courtesy of John T. Killian, M.D.
Patients with scoliosis that have a Cobb angle of 10° to 50° and a Risser score of zero to three are typically referred for brace treatment in efforts to halt curve progression before more invasive surgical methods of treatment are considered (Kalichman et al., 2016; Kuroki, 2018; Scoliosis Research Society, 2019a). Surgery is typically offered as an option to skeletally immature patients with curves over 45° or skeletally mature patients with curves over 50° (Kalichman et al., 2016; Scoliosis Research Society, 2019a). This study focuses on conservative methods of treatment, so surgical intervention will henceforth not be discussed.

_Special considerations for treating adolescents_

Depending on curve severity, AIS can be both a cosmetic and functional deformity. For this reason, it is important to consider patients’ self-image when treating AIS (Kalichman et al., 2016). Body image is a particularly pertinent aspect of health when treating adolescents as the “crucial period of spinal growth” occurs at the same time that “self-image and self-esteem develops” (Bettany-Saltikov et al., 2014, p. 113; Kalichman et al., 2016; Kuroki, 2018; Misterska et al., 2013; Talić et al., 2016).

Increased independence from parents and caregivers is also of great importance to adolescents (Reichel & Schanz, 2003). Receiving treatment for AIS can compromise typical developmental milestones in which peer relations take precedence over parental influence on adolescent socialization. The need for frequent medical care means AIS patients must rely on their caregivers as treatment managers and time for peer socialization is reduced. Heavy reliance on caregivers therefore challenges adolescents’
feelings of self-agency and efficacy as well as their desire to connect with and be accepted by peers, resulting in a reduced self-image (Reichel & Schanz, 2003).

As mapped in Figure 4, the correspondence of puberty and adolescence with the onset of AIS increases the risk of patients developing poor body image and reduced feelings of self-efficacy. The social and emotional development during these periods is highly vulnerable and dependent on perceived peer acceptance and feelings of independence. Having an abnormal spinal shape and greater than average needs for frequent medical care can counteract feelings of peer acceptance and autonomy in youth, contributing to a negative self-concept (Reichel & Schanz, 2003).

![Figure 4. Confounding risk factors for poor body image and reduced feelings of efficacy in patients with AIS. Puberty and adolescence overlap with the typical onset of AIS. The social and emotional development that accompanies puberty and adolescence is dependent on perceived peer acceptance and feelings of independence, which are hindered by having an abnormal spinal shape and relying on caregivers to manage medical care.](https://example.com/figure_4.png)

**Conservative treatment methods and mental health**

Certain treatment methods have a greater correlation with negative mental health symptoms than others. This review considers two conservative, non-surgical methods of treatment: bracing and physical therapy (PT). Bracing places external forces on the body in order to stabilize the spine and prevent the curve severity from increasing as
determined by the Cobb method (Figure 2). In most cases, braces are made of hard, rigid material and must be worn at least 20 to 23 hours a day until the patient is skeletally mature (Ersen et al., 2016; Kalichman et al., 2016). The most commonly prescribed brace is the Boston brace, displayed in Figure 5, and it can be used to treat the several different types of thoracic and lumbar curves (Gomez, Hresko, & Glotzbecker, 2016; McAfee, 2016). The Boston brace is a thoracic-lumbar-sacral orthosis (TLSO). It is customized to an individual’s curve specifications by adding corrective pads and cutouts to a premade mold (McAfee, 2016). The Boston brace is designed to apply pressure on the convex side of the curve and provide relief on the concave side to push the spine towards the body’s midline and prevent further growth in the coronal plane. Patients may need assistance taking the brace on and off as its closure is located in the back, further increasing their dependence on others to help them navigate AIS treatment (McAfee, 2016). While significant evidence supports bracing as an effective treatment for avoiding invasive spinal surgery, the efficacy of treatment is highly dependent on patient compliance (Gomez et al., 2016; Kuroki, 2018). Given the 20 to 23 hour wear-time requirement to achieve the most effective results, bracing is not particularly compatible with adolescents’ lifestyles, and therefore patient compliance is lower than desired (Vandal, Charles-Hilaire, & Bradet, 1999).
When compared to those only being treated with PT, AIS patients receiving brace therapy display a higher incidence of psychological disturbances, such as low self-esteem and poor body image (Bettany-Saltikov et al., 2014; Gomez et al., 2016; Kalichman et al., 2016; Kuroki, 2018). The use of PT in conjunction with bracing does not appear to counter these negative psychological effects. It is important for medical professionals to consider patients’ psyche because poor mental health is correlated with lower rates of treatment compliance and less favorable clinical outcomes as determined by spinal curvature progression during the bracing period (Misterska et al., 2013). Therefore, it is vital to examine the emotional support and mental health of AIS patients in order to predict treatment success (Gomez et al., 2016; Kuroki, 2018).

Unlike bracing, PT is not correlated with negative self-image. However, there is not substantial evidence to support the use of PT as a stand-alone treatment to bar curve
progression, and therefore it is often used simultaneously with brace treatment (Kalichman et al., 2016). PT usually prescribes activities that counterbalance the naturally occurring muscular discrepancies within the torso of an AIS patient (Bettany-Saltikov et al., 2014; Kalichman et al., 2016). Unfortunately, personal accounts of PT express that therapists are not emotionally gentle, that sessions do not adequately address the body-mind connection, and that exercises do not integrate into daily functional movement (Cordova-Caddes, 2019; Cranz, 2019). It should also be noted that PT tends to remove patients from the standard rhythms of peer social life by requiring patients to go to a clinic multiple times a week and prescribing home therapy programs that have patients strengthen or stretch muscles through repetitive exercises rather than practice movement that reflects daily activities (i.e. “functional” movement). Therefore, PT can further disrupt AIS patients’ participation in peer socialization (Cordova-Caddes, 2019; Naturalcarescoliosis, 2013; Reichel & Schanz, 2003).

**Shortcomings of conservative AIS treatment methods**

Physical therapy (PT) as it is commonly practiced in Western medicine does not adequately address the multidimensional aspects of wellness that should be considered when treating patients with AIS. Andrea Cordova-Caddes, DPT, explained that she opened her own holistic healing practice to provide the time and space to integrate somatic knowledge into PT. When Dr. Cordova-Caddes worked in a traditional PT setting, she felt that it was “too one-dimensional” (Cordova-Caddes, 2019). She was instructed to only treat one part of the body at a time and was not encouraged to utilize the interdependence of the entire body when rehabilitating patients. This approach limits
patients’ capacity for beneficial neuromuscular retraining because it only deals with issues as they present at a biomechanical level. Without addressing the interconnected domains of life that are affected by AIS, the mind and body are not able to integrate and retain efficient neuromuscular patterns (Cordova-Caddes, 2019; Warren, 2016). The emphasis on incorporating the psychological aspects of patient care is not to discount the biomechanical issues of AIS. More so, considering the many parts of life affected by the physiological impairment are vital to a complete healing process. “[How the diagnosis] feeds into [a patient’s] quality of life and how it feeds into their body image and pain and productivity and self-efficacy… is so important in treating the whole person” because it all “contributes to [their muscular] holding patterns” (Cordova-Caddes, 2019).

Dr. Galen Cranz, a lecturer at University of California Berkeley known for her contributions to ergonomic design, made similar comments reflecting on her own PT treatment for AIS. She noted that she did not think “just straight physical therapy was very effective for [her] as a child because it [did not] have the emotional and psychological and mental/cognitive component” (Cranz, 2019). The multi-pronged approach to health that is lacking in PT is critical to changing AIS patients’ mindsets towards both their diagnoses and prognoses. It is essential that patients understand “they are doing things on their own, and [they are] not dependent on somebody to care for them, and that [they are] not broken…[They are with themselves] 24/7 so [they] have to be able to make those accommodations and those adjustments…[to make their movements] more functional” (Cordova-Caddes, 2019). Yet, bracing and PT do not adequately promote such agency in AIS patients. If anything, bracing diminishes patient efficacy because they have to rely on an external structure to “fix” them (Cranz, 2019).
This conceptualization of bracing implies that patients are broken and cannot do anything from their internal position to help themselves. Offering supplemental treatment that incorporates and validates patient knowledge and education, as does the field of somatics, which is explored in the following chapter, could help curb feelings of decreased self-image and autonomy.
WHAT IS SOMATICS?

_Somatics as a field_

Somatics is a field of codified, experiential methods of exploring the body from a first-person perspective, where patient knowledge is centralized, validated, and incorporated into treatment (Caetano, 2015). Derived from the ancient Greek word “soma,” which means “the living body in its wholeness,” the term “somatic education” was coined by Thomas Hanna in the 1970s to “describe methods of education which worked with both the mind and body to improve health and functioning” (Warren, 2016). This field of work has since broadened to include various modalities which are collectively referred to as “somatics.” All somatic methods conceptualize the mind and body as equal parts to a whole, recognizing that the physical, mental, and emotional states of one’s health are inextricably linked. (Caetano, 2015; Cohen, Bonnie Bainbridge, 2003, 2006; Cordova-Caddes, 2019).

Somatics used as a supplement to current treatments of AIS may decrease the incidence of poor body image and increase patient efficacy by encouraging a greater understanding of one’s own body. For example, somatic practitioners will ask their clients how they feel moving in their body in order to inform the goals and trajectory of each somatic training session (Carli-Mills, 2018; Schultz, 2019). Asking AIS patients for feedback about their body as perceived from within encourages patients to conceptualize their bodies from a functional standpoint and to describe themselves in terms other than the straightness of their spine, contributing to a healthier body image (Carli-Mills, 2018; Winzeler, 2005). Somatics merges physical and mental wellness, which are currently
siloed in Western medicine. In patients with AIS, negative body image and reduced self-efficacy are brought on by a physical ailment, so it is appropriate to consider somatics as a means to treat the comorbid psychological disturbances of AIS in a holistic manner (Talić et al., 2016).

While psychotherapy is not an explicit intention of somatics, the non-dualistic nature of the field inevitably addresses issues pertaining to body image and self-concept while treating corporally-based inefficiencies (Gelb, 1994). A few key tenets of somatics make the field especially equipped to simultaneously attend to the concurrent physiological and psychological issues associated with AIS. These tenets include the inherent integration of physical and mental health, neuromuscular repatterning, and the emphasis on patient knowledge and education.

Keyp tenets of somatics

Inherent body-mind connection

A core tenet of somatics is nurturing the undeniable connection of the body and mind (Gelb, 1994; Knaster, 1996; Warren, 2016). Movement is affected by one’s thoughts, and thoughts are affected by one’s movement, yet Western medicine does not approach AIS in an integrated fashion. Some empirical sources suggest addressing poor mental health in AIS patients by supplementing brace treatment with talk therapy (Cheung, Cheng, Chan, Yeung, & Luk, 2007). Such recommendations demonstrate a dualistic approach to a multifaceted issue. Talk therapy often focuses solely on matters of mental health, so simply adding talk therapy to the treatment plan for AIS would not
engage with the negative psychological symptoms at their physical origin. Isolated pillars of care would separately undertake poor body image, stifled self-efficacy, and the physical symptoms of AIS despite these concerns sharing the same cause: spinal abnormality in adolescence.

Somatics exists as a suitable holistic approach to explore the composite nature of AIS and bridge the gap between physiological and psychological care. As the issue at hand involves psychological issues that stem from a physical impairment, it makes sense to use methods of body learning that integrate the body and mind in their very essence, rather than traditional talk therapy. By embracing the inherent body-mind connection, somatics recognizes that both the brain and body need to be included in retraining muscles to release chronic tension and establish more efficient movement patterns (Abrams, n.d.). Through somatic training, people gain a clearer understanding of where movement is initiated in their bodies, allowing actions to be executed with greater efficiency.

*Neuromuscular repatterning*

The nervous system should naturally possess the innate wisdom to automatically take the most efficient path to movement possible by recruiting the most appropriate muscles for each physical task. However, people are prone to develop chronic muscle tension overtime, which causes inefficiencies in movement (Abrams, n.d.). The brain continually signals to the body to contract muscles that are not actually needed to execute a given movement, generating constant tension. People lose awareness, and therefore control of, these habitual muscle contractions, a phenomenon which Hanna called
Sensory Motor Amnesia (SMA) (Allison, 1999; Hanna, 1988). Conservative methods of treating AIS often only approach the disorder from a biomechanical standpoint. Somatics urges a more holistic attitude that considers the neuromuscular aspects of the ailment as well. This neuromuscular repatterning would be beneficial to incorporate into AIS treatment because healing methods that take advantage of the neuroplasticity of the central nervous system have been shown to have the greatest potential for bringing about long-lasting positive changes in musculature (Myers, 2016).

The inherent body-mind connection central to somatics acknowledges that the brain needs to be retrained in order for the body to be retrained (Myers, 2016). Thus, somatic work involves repatterning movement pathways at the subcortical, or subconscious, level. In somatics, the subcortical level of movement initiation can be accessed through breath, awareness, slow and conscious movement, and clear mental imagery (Abrams, n.d.). Such methodical training can help relieve the chronic tension in the body that usually exacerbates scoliotic curvature in AIS patients (Caplan, 1987).

The somatics approach to neuromuscular repatterning also facilitates a more open-minded understanding of physical ailments by proposing that the way people use their bodies is due to learned patterns that can change with education and training (Cordova-Caddes, 2019; Schultz, 2019; Warren, 2016). Somatics recognizes a possibility for change through neuromuscular retraining in situations which Western medical practitioners would consider permanent (Warren, 2016). Such is illustrated by brace treatment of AIS. Braces use external force to push the body into alignment, giving patients a passive role in their own healing process, and inadvertently perpetuating the idea that patients have no efficacy to change their own body from the inside. As a result,
patients may sink into their brace, further numbing their internal awareness of their own alignment and reinforcing poor muscular use patterns (Caplan, 1987). However, if patients perceive their brace as a benign aid, and not an overpowering force, then they may take more responsibility for retraining their own muscles (Caplan, 1987; Carli-Mills, 2018). Somatics combats reduced feelings of agency by helping the patient recognize their own SMA. Once the brace is removed, muscular adjustments are more likely to be maintained because change was not only affected through external pressure but also ingrained at a neurological level (Caplan, 1987).

Incorporation of patient knowledge and education

Somatics rests on the idea that people are self-sensing, self-regulating, and self-actualizing, meaning that they have the power and ability to repattern themselves from the inside. The holistic approach to wellness is rooted in valuing and incorporating the subjective patient experience and educating the patient to give them the knowledge necessary to attend to their own habitual patterns of movement (Allison, 1999; Cordova-Caddes, 2019). Somatic professionals acknowledge that the patient holds the most wisdom about their own body as they are the only person with lived experience in their body. Therefore, the integration of patient awareness and insight into their treatment plan is vital. Asking for and listening to patient feedback is essential to validate patients’ experiences and increase their feelings of efficacy (Caetano, 2015; Cohen, Bonnie Bainbridge, 2003; Cordova-Caddes, 2019). Patients know how their bodies feel and move from the inside, and perhaps with prompting from somatic practitioners, they can express
what parts of their bodies and movements they feel are in and out of their control (Cordova-Caddes, 2019).

Somatics approaches corporeal inefficiencies from the inside out to reestablish a feeling of control and responsibility over one’s own neuromuscular patterning. This framework is juxtaposed with bracing which provides an external support to hold a patient in place. Although proven somewhat effective in preventing further curve progression, bracing does not actively facilitate the rewiring of neuromuscular patterns, which partially explains the need to wear a brace for 23 hours a day in order to obtain the most effective results (Caplan, 1987; Ersen et al., 2016). The constant external pressure can be both mentally and physically cumbersome on adolescents, so practicing somatics could be beneficial by helping patients better understand and appreciate their bodies’ capabilities rather than dwell in imperfections and rely on an orthosis to externally “fix” their spine (Carli-Mills, 2018).

The reclamation of one’s own experiences to address AIS from a holistic internal lens rather than through external forces validates adolescents’ experiences and gives them more responsibility in their treatment. The increased responsibility may be an additional benefit because being treated for an orthopedic abnormality in adolescence has been correlated with a delay in the developmental milestone of becoming more independent from parents (Reichel & Schanz, 2003). In somatics, part of training is becoming more independent and developing a greater sense of self-efficacy. One somatic practitioner, Rebecca Carli-Mills, explains that “[in sessions with brace-wearing adolescents, [she finds] it useful to spend some time working with the brace on… what happens if [patients] sense themselves touching the brace, instead of only the brace defining
them...If the brace is accepted and integrated into their body schema, compliance is less difficult” (Carli-Mills, 2018, p. 22). By combining holistic body work with brace treatment, Carli-Mills is able to facilitate a more positive outlook on treatment. Her AIS patients feel that they are able to transcend the rigid limits of the brace and maintain control of their treatment outcome.

Substantial involvement in treatment and learning about AIS equips patients with the tools to implement more efficient movement patterns outside of the somatic lessons themselves, again increasing patient efficacy. The tutorial aspect of somatics is also likely to improve patient compliance to their treatment plan because the more someone understands about their diagnosis, the more likely they are to adhere to treatment and experience a favorable outcome (Lynggaard et al., 2017). Since patient compliance is of primary concern when prescribing brace treatment, the educational component of somatics would complement bracing particularly well (Gomez et al., 2016; Kalichman et al., 2016; Kuroki, 2018; Lynggaard et al., 2017; Vandal et al., 1999).

*Somatics bridges the gaps in Western medicine*

Somatics as a field should be considered as supplemental treatment to conservative methods of managing AIS. All somatic disciplines maintain the core philosophies that the wellness of the body and mind are inextricable, that neuromuscular patterns which cause tension can be retrained, and that patients hold valuable knowledge about their bodies that only they are privy to (Allison, 1999; Cordova-Caddes, 2019; Knaster, 1996). The integration of mental and physical health, which is all too absent in Western approaches to treating AIS, makes somatics well-equipped to address the issues
of negative body image and reduced self-efficacy spurred by the diagnosis and treatment of AIS.

Unlike Western medicine, somatics recognizes that subjective patient experience should be validated and incorporated into treatment planning and implementation, which supports greater feelings of self-efficacy among patients (Cordova-Caddes, 2019). Emphasis on internal feelings and functioning also helps shift patients’ conceptualization of their spinal deformity away from external appearance, nurturing a more positive body image (Carli-Mills, 2018). Furthermore, somatic pedagogy educates patients such that they become more aware of how their bodies function by recognizing and understanding their own habitual neuromuscular patterns, contributing to more favorable health outcomes (Warren, 2016). The benefits experienced due to patients’ engagement in their healing process further encourages patients’ feelings of efficacy, creating a positive feedback loop. Figure 6 illustrates the reciprocal relationship between patient efficacy and long-term maintenance of muscular change.

![Figure 6. Relationship of patient efficacy and treatment effectiveness.](image)

When a patient feels they have more control over their own body, they are more likely to take responsibility and comply with treatment (Carli-Mills, 2018; Cordova-Caddes, 2019; Lynggaard et al., 2017).
Training in somatics gives patients the knowledge to help themselves so that they may feel less reliant on external forces and other people to fix their ailments (Cordova-Caddes, 2019; Warren, 2016). Based on the previously summarized tenets, many somatic methods could improve AIS patient experience. Even so, there does exist one discipline that seems especially well-suited to treat AIS: Alexander Technique, which is the subject of the next chapter.
WHY ALEXANDER TECHNIQUE

F.M. Alexander and the creation of the technique

Alexander Technique (AT) is named for its creator, Frederick Mathias (F.M.) Alexander, a performance artist from Australia who discovered the technique as a means to resolve his own recurrent respiratory and vocal issues. Alexander was born in 1869 and suffered from respiratory ailments as a young child. His respiration and vocal issues subsided in his late childhood and adolescence, only to reappear in his twenties when he pursued a career in acting and recitation (Gelb, 1994). His voice would go hoarse while reciting, impeding his career and quality of life.

Alexander consulted his primary care physician, who suggested that he use his voice as little as possible when he was not performing in order to rest his vocal cords. Although a century has since passed, in many ways, Alexander’s treatment reflects the current approach to treating scoliosis with a brace: immobilize the issue. If one stops use and stops movement, perhaps the issue will resolve. Unfortunately, deterring use is not a functional approach to healing as it does not reflect how people want to use their bodies (Cordova-Caddes, 2019). Not using the part of the body that is injured leaves many people unsatisfied and disenchanted with standard Western medical practices, Alexander included. Not only was he unable to use his voice in day-to-day situations, interfering with his quality of life, the next time he performed after two weeks of resting his voice, he became hoarse halfway through his act (Alexander, 1932).

Disappointed with the results from his physician’s paralyzing method of treatment, Alexander took matters into his own hands. He rehearsed in front of a mirror,
convinced that there was something wrong with his habitual and unconscious engagement of muscles that must be causing his voice to wear out (Alexander, 1932; Gelb, 1994). His instincts were correct as he quickly realized that when he recited, he stiffened his neck and pulled his head back, posteriorly compressing his atlanto-occipital joint (Figure 7). Alexander’s holding pattern also depressed his larynx and caused him to audibly gasp for air when he was reciting. His muscular misuse culminated in a hoarse voice (Gelb, 1994; Warren, 2016). With the understanding that the tension in his neck was the culprit of his respiratory issues, Alexander made a conscious effort to undo this habit and find a more efficient pattern of movement. The process he codified to unlearn poor habits and establish more efficient neuromuscular patterns constitutes the Alexander Technique. The exact mechanisms and guiding principles of AT are explored throughout this chapter.

Figure 7. Head back and down versus forward and up. The left demonstrates the head going back and down, which compresses the atlanto-occipital joint and larynx. The right shows the head going forward and up, which releases tension in the posterior neck muscles and promotes more efficient muscular patterning throughout the entire body.

Image courtesy of Annie Whitehead
By practicing his technique, Alexander’s voice was able to sustain through performances, and his physicians even noticed that his larynx looked healthier and less aggravated (Gelb, 1994). Alexander’s success in healing his own vocal and respiratory ailments prompted him to further research how the use of the body affects all aspects of human functioning. Alexander opened a practice to train others in AT and found that most of the people who came to him were actually seeking treatment for medical conditions, and not vocal coaching (Warren, 2016). Today, a substantial number of individuals who look to AT for relief often suffer from chronic neck and spine injuries and disorders, including scoliosis (Allison, 1999). Individuals with scoliosis have noted that training in AT helps improve their function and self-efficacy, and one of their stories follows (Caplan, 1987; Cranz, 2019).

*Individualization and application to functional movement*

Of the numerous somatic modalities available to study, AT should be further examined as a supplement to treating AIS. Its approach to somatic work makes it an ideal introduction to body-mind practices. Such is detailed by the story of Dr. Galen Cranz. She documented her own journey with scoliosis and how AT has helped her improve her pain, mobility, and self-image. Dr. Cranz was diagnosed with scoliosis when she was 12-years-old and opted for observation, osteopathy, and PT to treat her progressive curve (Naturalcarescoliosis, 2013). Unfortunately, osteopathy and PT did not integrate well into her lifestyle nor did they address the psychological toll of AIS. She described scoliosis as a “lonely, isolating condition” for a young adolescent (Naturalcarescoliosis, 2013, pt. 6:12). Her PT regimen often pulled her away from her peers and family as the clinic was
not easily accessible, and her home exercise program did not integrate movement into her daily routine. The exercises she was prescribed were not functional, meaning they did not reflect the movement patterns that she went through in her daily life, so they could “not train [her] muscles to support [her] spine properly” (Caplan, 1987, p. 177).

Dr. Cranz found AT as a young adult through a friend’s recommendation. After her first lesson she recalls being without her typical back pain (AlexTechNews, 2015). Continued training in AT brought about more physical and mental flexibility. Her understanding of her body transformed from something that was fixed in its structure to something that can change with practice. Habits can be undone and more efficient ways of moving can be learned in their place. The change in mindset was accompanied by a change in physical structure; Dr. Cranz measured 13° of improvement in her spinal curvature after a semester of intense training at an AT school (AlexTechNews, 2015). The change in mindset and body are inextricable as the work needed from the patient to physically improve scoliosis is dependent on a patient’s feeling of efficacy and understanding of their own body. Reciprocally, witnessing improvement in one’s physical appearance reinforces patient efficacy and a more positive body image (Cordova-Caddes, 2019). The physical, mental, and emotional changes that Dr. Cranz recalls are co-dependent on one another, characteristic of a holistic approach to healthcare (Figure 6).

AT can help improve posture in AIS patients without causing the isolating social effects that Dr. Cranz described experiencing during PT treatment. AT is comprised of guiding principles, differing from PT exercises, which are often preset and prescribed generally for all scoliotic curves. The physical manifestations of the AT principles can be
better tailored to each individual lifestyle and scoliotic curve (Cranz, 2019). Dr. Cranz explained, “[patients] have to change [their] everyday movement, and that’s why Alexander [Technique] becomes so important…it’s not special postures… it’s everyday ordinary activities” through which the following principles can be practiced (2019).

The Principles

The seven Alexander principles are: use and functioning, the whole person, unreliable sensory appreciation, primary control, inhibition, direction, and ends and means (Gelb, 1994). Although AT was not developed specifically as a treatment for scoliosis, each principle can be applied to address physical, emotional, and/or mental health concerns related to AIS. As do the domains of health, the principles tend to blend together; application of one principle is likely to spur change in the manifestation of another, whether or not such an effect is intentional.

Use and functioning

This first principle refers to people’s physical patterns; which muscles are chronically contracted and how does this chronic tension affect the execution of everyday movements? Understanding one’s use of self requires taking a nonjudgmental inventory of one’s habits (Schultz, 2019). In order to know what can be improved, the patient must first identify which muscles are constantly activated and use unnecessary amounts of energy. The use and functioning principle considers how neuromuscular habits tie physical, emotional, and mental health together. Recognizing tension patterns in the body in order to undo them will also release tensions of the mind (Cordova-Caddes, 2019).
Similarly, the idea that the body can change and that taking note of its use is the first step towards improving neuromuscular habits facilitates a more flexible and accepting sense of self. This would theoretically combat issues of poor body image and low self-efficacy in patients with AIS (Gelb, 1994).

Several ailments that are labeled “idiopathic” by Western medicine are often linked to poor use of self (Gelb, 1994). Western practices have a tendency to focus narrowly on the specific body part that presents a biomechanical issue while overlooking the underlying patterns of a person’s movement (Cordova-Caddes, 2019). Idiopathic ailments may be referred to as “functional disorders” or “psychosomatic problems,” for which Western medicine offers palliative care to address individual symptoms, but little effort is dedicated to identify and treat the global cause of psychosomatic issues (Gelb, 1994). If psychopathological symptoms persist, then a Western practitioner may refer patients to a psychiatrist, illustrating a siloed approach to healthcare (Gelb, 1994).

Patients with issues involving the mind and body are generally passed from one specialist to another without anyone taking a look into what could be the root cause of both their physical and psychological issues: how one uses their body in everyday functioning. Not only does this truncate people’s potential for rehabilitating functional movement patterns, it also invalidates patients’ subjective experience and compromises their feelings of agency over their own health outcomes (Cordova-Caddes, 2019).

The whole person

Many treatment plans devised by single-discipline approaches to AIS often address individual parts of a person’s body rather than their entire being (Gelb, 1994). AT
recognizes that no one health issue affects only one domain of the “threefold model of human functioning,” which includes physical, mental, and emotional health (Gelb, 1994, p. 35). Ignoring the affiliations between the three domains compromises people’s use of energy. Rather than being in control of one whole, integrated body, people attempt to separately control several different parts of the body, each out of sync with the next. Organizing one’s self-image in such a disjointed fashion muddles concepts of identity and drains physical and mental energy. The practice of specialization in Western medicine is again criticized for fragmenting the body into isolated factions without cohesively connecting them into the singular being that they collectively compose, as is acknowledged by AT (Gelb, 1994).

Unreliable sensory appreciation

Unreliable sensory appreciation mimics SMA and refers to how people are numbed to frequently occurring sensations (Gelb, 1994). Unreliable sensory appreciation can happen in any sense, for example, tuning out the streetcar that passes by the window every night at 11:00PM. In reference to AT and somatics, it often refers to proprioceptive desensitization. One does not notice that they lean into their right hip when they stand or that their left shoulder is stuck in internal rotation. People become immune to their movement habits, and that makes it difficult to address alignment issues through their own actions. Instead of seeking proper training to undo inefficient habits, AIS patients are directed to use a stiff brace that limits their range of motion. The reliance on external forces means that bracing offers nothing to promote maintenance of spinal alignment post-bracing, or even during the bracing period when a patient is not wearing their brace.
The advertised and intended result of bracing is to stop the Cobb angle from increasing, but never to decrease its magnitude. Bracing does not offer true “correction,” because it does not retrain the neuromuscular connections.

By contrast, AT approaches unreliable sensory appreciation in a way that repatterns neuromuscular connections through constructive rest\(^1\) (CR) to release chronic tension and promote a more efficient use of energy, posture, and alignment (Abrams, n.d.; Gelb, 1994; Schultz, 2019). As illustrated by Figure 8, CR generally takes place in a semi-supine position with the head supported by books to maintain the forward and up alignment (Gelb, 1994). An AT teacher will guide the patient through imagery that evokes the thought of movement, but the patient does not actually engage any muscles (Abrams, n.d.). The patient stays still, releasing any tension into the floor and engaging in movement repatterning through their thoughts. Approaching movement learning at the neurological level rather than going straight into working at the muscular level allows for repatterning to take place at the subcortical, or below the conscious, level. Retraining movement patterns at the subcortical level is important because it is the subcortical control that perpetuates chronic overuse of muscles in everyday movement (Abrams, n.d.). CR also helps identify places of unreliable sensory appreciation because muscles that are chronically tense during standing may produce discomfort when they are released in the CR position (Abrams, n.d., Figure 8).

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\(^1\) Alternatively referred to as “active rest” or “balanced resting state” (Gelb, 1994)
Recognizing where in the body one experiences unreliable sensory awareness is a crucial step in being able to change one’s alignment and external presentation from the inside, subsequently improving self-image and efficacy (Caplan, 1987). Perhaps if patients are able to maintain better alignment outside of the brace throughout the bracing period, the poorly adhered to expectation of wearing a brace for 23 hours every day could be lowered to be more compatible with adolescent lifestyles and values (Ersen et al., 2016). Reduced bracing time would greatly improve daily quality of life for teenagers who want to participate in sports, go to the pool, or go to a special event without the stigma of wearing a cumbersome structure around their bodies (Reichel & Schanz, 2003; Talić et al., 2016).

**Figure 8. Constructive rest position.** During CR, a patient will often be instructed to lie on their backs in a semi-supine position. Their head will be supported by books. Their feet will be in line with their hips and planted on the ground, and their knees will be bent upwards.

Image courtesy of Gelb, 1994
Primary control

Primary control refers to the idea that the alignment of the head and neck affects all other alignment. When Alexander was developing his technique in hopes of saving his voice, he recognized that when he put his neck “back and down” he would tense his posterior neck muscles, which threw his body out of proper alignment and put unnecessary strain on his larynx. In order to recite without compressing his larynx, Alexander needed to first find space and greater ease of motion where his head and neck met (Alexander, 1932; Gelb, 1994). He would achieve this ease of motion and freedom in his posterior neck muscles by bringing his head “forward and up,” allowing for the rest of the body to experience an efficient use of energy. Figure 9 demonstrates how proper alignment at the head and neck travels all the way down to the feet. To exemplify just one of many neuromuscular patterns that AT makes more efficient, proper alignment at the atlanto-occipital joint encourages people to use the floor to push themselves up rather than clench in the upper body to pull themselves up against gravity.

Figure 9. Primary control: Head forward and up. On the left is an inefficient holding pattern in which the neck is “back and down” On the right is the desired atlanto-occipital alignment that AT encourages.

Image courtesy of Hilary Cook
The focus on adjusting alignment from the superior-most part of the spine makes AT applicable to treating both thoracic and lumbar curves as the release of strain at vertebra C1 will sequence further down the spine (Cranz, 2019). The general guideline of the technique emphasizes maintaining the freedom at the atlanto-occipital joint throughout all aspects of executing any functional movement.

**Inhibition**

The inhibition principle is key to obtaining the efficiency in movement so highly sought after in several somatic modalities. It emphasizes that modern life and social expectations make many people prone to execute tasks quickly, but often with inefficient muscular patterning. In order to rewire functional movement patterns so that the body is used in a more energy-efficient manner and proper spinal alignment is maintained, it is necessary to first inhibit habits that do not promote an efficient use of the self. Inhibition is the first step to implementing primary control, i.e. bringing the head forward and up so that the torso may lengthen and widen (Alexander, 1932; Gelb, 1994; Schultz, 2019).

Individual AT instructors will use CR and hands-on cues to help patients learn inhibition and reduce held tensions in their body. For example, practitioners may ask a patient to release muscle contraction and allow them to move the patient’s limbs for them. This is a practice in inhibition, as the standard response to someone moving one’s body is often to resist their efforts and contract more muscles than necessary for the given situation (Schultz, 2019). The patient is asked to not respond to the stimulus of someone else moving them, eventually allowing the body to only react to necessary stimuli with a more appropriate amount of effort instead of overexerting themselves. The inhibition
principle applied to AIS patients would help train patients to maintain posture that counteracts rather than accelerates scoliotic curvature progression without feeling fatigued (Caplan, 1987).

Direction

The body-mind interplay is particularly apparent when considering direction. Directions frequently referenced in the AT are “forward and up” in relation to the head at the atlanto-occipital joint. It has been shown that even imagining the body doing something brings about a “subtle yet heightened degree of muscle tone [that] can be maintained” in that body part (Gelb, 1994, p. 75). Just the continual visualization of bringing the head forward and up promotes muscle tone appropriate for maintaining proper alignment to replace one’s previous inefficient holding patterns that were inhibited through AT. This thought practice can be done at any time: while typing on the computer, while giving a presentation in class, while cooking, etc., exemplifying how AT can be applied to all types of functional movement without disrupting the rhythm of patients’ daily routines.

Lessons in the direction principle also help promote a more flexible understanding of one’s body and its abilities. Lessons focus not only on utilizing the space in front and above the patient but also on the ground below their feet, extending into the core of the Earth, and the space behind them (Schultz, 2019). These lessons present the limitless options and choices the body has for movement, expanding AIS patients’ previously narrow idea of what their body could do given the traditional rhetoric that surrounds scoliosis and the physical barrier of a rigid brace. Imagining the body reaching into all
directions of space encourages minute changes in muscle tone that over time lengthen and widen the back rather than constrain it.

*Ends and means*

This principle emphasizes the importance of *how* one does things over *what* one accomplishes. Current AIS treatment methods, such as bracing and PT, are often presented to patients with an end-gaining attitude. One will need to be in an unattractive brace for several months to years in hopes of reducing the progression of their curve. Unfortunately, the end goal is not even guaranteed given bracing success rates, yet Western medicine still focuses on the ends over the means (Kuroki, 2018). Prioritizing the end goal over patient experience during treatment ignores the multi-domain effects of bracing on adolescents’ physical, mental, and emotional well-being. This is problematic because it is during the treatment period that poor body image is often heightened in AIS patients (Kuroki, 2018; Misterska et al., 2013; Talić et al., 2016).

AT training would counteract the development of negative body image by focusing on how the body executes movement and how it feels internally while going through different motions (Winzeler, 2005). The danger of end-gaining in the treatment process of AIS is that it prioritizes the numerical measurement (i.e. the Cobb angle) over other non-physical aspects of AIS that also contribute to patients’ quality of life. AT does not put undue weight on the final outcome measurements of scoliotic curves, so it considers the patient in more holistic terms than mechanical markers of health, acting as a protective factor against diminished body image in AIS patients.
The general technique

Below is a five-step process summarizing the Alexander Technique as it can be applied to all functional activity. The principles appear throughout the technique in varying degrees but are all essential aspects to fully incorporate AT into one’s daily life.

1. Inhibit one’s immediate response to a stimulus to gain a specific end (ex: The bell to signal the end of a course period rings. Instead of immediately jumping up and slinging one’s bookbag over the same shoulder that they always hold their bag on, pause to consider that one has choices in how they will execute the next movement.)

2. Project in the directions for primary control. The head goes forward and up so the neck can be free and the torso can lengthen and widen (Alexander, 1932; Schultz, 2019).

3. Continue to project in the directions for primary control until they feel solid enough to be maintained while achieving the original end goal (ex: Before reaching for one’s bookbag feel the energy projecting forward and up so that it becomes integrated into one’s posture and is not abandoned once returning to the original task at hand.)

4. Still projecting into the primary control directions, one should ask themselves if they want to proceed to the original goal. They also have the option to stay where they are and not achieve anything in particular apart from a wider and longer torso. They can also continue on with a different task. The key here is to recognize that one has options.
5. The final step is to either execute or not execute any end goal: From this point of freedom, while projecting forward and up, one can decide to continue on and attain their original goal (ex: grabbing one’s bookbag and leaving the classroom), not do what they originally intended based on the initial stimulus (ex: stay seated at their desk and not move their location), or do something entirely different (ex: ask their instructor how their weekend was). Regardless of which path one elects, they should “continue to project the directions for maintaining the new use” of self and experiencing less tension at the atlanto-occipital joint and throughout the body (Alexander, 1932, pp. 33–34).

*Integration of AT into everyday actions to redefine one’s self-concept and efficacy*

To recognize that one has options is not to negate the consequences of actions in relation to social expectations; it is more of a thought practice that will in turn change how one moves in their body. Acknowledgement of options is necessary for people to realize that they have more physical and mental freedom than they often believe (Schultz, 2019). In this regard, AT is helpful in making peoples’ concepts of their bodies and minds more expansive and flexible. There are more options for finding greater range of motion, for coming to peace with one’s curves and external appearance, and for living a life unhindered by the constraints of traditional AIS treatment. AT promotes a more positive self-image and restores self-efficacy that adolescents may feel scoliosis took from them (Reichel & Schanz, 2003).

It is proposed that AT be used to supplement conservative treatment of AIS because its principles counteract the negative mental health symptoms experienced by
many patients. Just as scoliosis affects every movement and activity that one participates in on the physical, mental, and emotional levels of health, so too do the AT principles (Cranz, 2019). The technique’s ability to be applied to everyday actions may help patients feel like their treatment is more integrated into and compatible with their adolescent lifestyle. If patients do not feel that treatment isolates them from the flow of familial and peer socialization, they will probably display less resentment towards and better compliance to their treatment, ultimately leading to a more desirable health outcome (Gomez et al., 2016; Kuroki, 2018).

Finally, AT has been noted to be a good “pre-technique” for those interested in practicing other somatic modalities. Having the tools to attend to one’s own alignment and integrate that change into all aspects of their life will make them more receptive to later body work teachings, whether they are other somatic modalities, PT, or any host of physical practices (Cranz, 2019).
**EXPERIMENT**

**Hypothesis**

Based on the previously presented research, it is hypothesized that supplementing conservative treatment of adolescent idiopathic scoliosis (AIS) with Alexander Technique (AT) would improve holistic patient outcomes by encouraging greater functional movement, self-efficacy, and a more positive body image.

**Methods**

**Participants**

Participants will be recruited using word of mouth. Patients with moderate, progressive AIS and undergoing observation or Boston brace treatment will be informed of the study by their physician. Participants will enter into the study on a voluntary basis, understanding that within the observation or bracing group, they will be selected to be in either an AT group or a non-AT group. Selections will be made in attempt to keep the subgroups of observation and bracing matched for age, AIS diagnosis, and prognosis (i.e. curve location, Cobb angle, and Risser system prediction of skeletal maturity at the start of the study). Participants must between 11 and 14 years old. This age range falls within the parameters of puberty for both males and females, when emotional and physical changes are most prominent and patients are likely to be considered for brace treatment (Carli-Mills, 2018; National Institutes of Health, 2016; Scoliosis Research Society, 2019a; Winzeler, 2005). Prior to the experiment’s commencement, participants and their
parents or legal guardians will be informed of their rights in the study. Since all participants will be legal minors, they will need to sign assent forms, and their parents or legal guardians must sign consent forms allowing their children to participate in the study.

_Treatment groups_

There will be four experimental groups: Observation (Obs), Boston brace treatment (BB), observation and Alexander Technique (OAT), and Boston brace treatment and Alexander Technique (BAT). Each group will have between ten and thirty participants. There is no guarantee that the number of participants in both observation groups (Obs and OAT) will be equal to the number of participants in both bracing groups (BB and BAT) as participants will enter the study having previously elected their conservative method of AIS treatment. However, participants under each type of conservative treatment will be evenly distributed amongst the AT and non-AT groups (i.e. \( n_{\text{Obs}} = n_{\text{OAT}} \) and \( n_{\text{BB}} = n_{\text{BAT}} \)). Participants assigned to the AT groups (OAT and BAT) must attend weekly individual AT lessons and adhere to any practice exercises that their AT instructor prescribes in addition to their observation or bracing treatment plan.

Although it would also be relevant have an observation and PT and Boston brace and PT group, PT is not a factor in this study. PT is excluded from the study because, according to previous literature, it has not been associated with exacerbating nor mitigating negative mental health symptoms related to AIS diagnosis and brace treatment. Additionally, PT does not have the same clinical efficacy of preventing curve progression as bracing does and is therefore less likely to be prescribed as a primary or
stand-alone treatment for AIS (Bettany-Saltikov et al., 2014; Gomez et al., 2016; Kalichman et al., 2016).

If the AT treatment is found to deliver the predicted benefits, participants who were not in the AT experimental groups will be given the option to take AT lessons once the study concludes.

Data collection

The study will take place over a twelve-month period with an initial check-in at the start of the study and follow-up check-ins at three, six, nine, and twelve months. During check-ins participants will complete the patient-reported SRS-22 questionnaire (Appendix), have posterior spinal X-rays taken (both in and out of the brace for bracing groups), and have photographs taken against a grid background (Figure 12).

The SRS-22 questionnaire is published by the Scoliosis Research Society and is intended to assess quality of life (QoL) in youth with idiopathic scoliosis.

“It consists of five domains: function/activity (5 questions), pain (5 questions), self-image/appearance [body image] (5 questions), mental health (5 questions) and satisfaction with management (2 questions), making 22 questions in total… Each question from the SRS-22 consists of five options scored from 1 to 5. The higher the score, the more satisfied the patient is” (Cheung et al., 2007, sec. Discussion).

This quantitative tool helps standardize individual patients’ experiences so that they can be compared and extrapolated for more universal analysis. It is imperative that this experiment uses a survey that takes “into account not only the physical health of the
patient, but also the emotional and psychosocial factors previously overlooked in traditional outcome studies” (Cheung et al., 2007, sec. Conclusion). The five domains covered by the SRS-22 are shown in Figure 10. Each factor has a reciprocal relationship with treatment compliance and self-efficacy and therefore should be considered when determining treatment plans for patients (Carli-Mills, 2018). However, given the scope and purpose of this study, only predictions for function/activity, self-image/appearance (body image), and mental health are made (marked by an asterisk in Figure 10). It should also be noted that in this study, the results for mental health encompass feelings associated with body image as well as self-efficacy. Therefore, the predicted results for mental health and body image are bound together.

Figure 10. Primary factors contributing to quality of life in patients being treated for AIS. The five domains covered by the SRS-22 all contribute to AIS patients’ holistic wellness and quality of life.
Expected results

**SRS-22 questionnaire**

Data from the SRS-22 will be tested for normality. If the data assumes a normal distribution, a two-way repeated measures ANOVA will be performed on the SRS-22 data for the function/activity, body image, and mental health domains to create a model of treatment outcomes as they progress over a year (Statistic How To, 2019). If the data violates the normality assumption, the non-parametric Scheirer-Ray-Hare test will be performed to analyze variance instead of an ANOVA (Mangiafico, 2016). Initial analyses will be followed by a Tukey’s method pairwise comparison to determine if there are significant differences between the outcome measures of each treatment group within each domain. Figure 11 depicts the expected outcomes by domain and across treatment groups according to the SRS-22 questionnaire responses.

(a) Function/activity  
(b) Body image  
(c) Mental health

![Figure 11. Expected trends of SRS-22 questionnaire results by domain across treatment groups. (a) Function/activity (b) Body image (c) Mental health. Color denotes change in a favored (green) or unfavored (red) direction. Yellow denotes no significant change. The relative size of the circles denotes the relative magnitude of change within that domain for each treatment group as compared to other groups.](image-url)
The OAT group is expected to report the most satisfactory change in all three categories of interest because they will not experience the negative psychological effects of bracing (Cheung et al., 2007). Therefore, the OAT group will feel the benefits from AT (greater ease of motion, improved body image, and increased efficacy) without benefits being mitigated by brace treatment. Furthermore, the OAT group is expected to report a greater magnitude of positive change in function/activity than the BAT group because they will not have a rigid brace restricting their range of motion.

When AT is the only difference between groups (i.e. O-OAT and B-BAT), the AT group is expected to report more satisfactory results across the board. However, no statistical change in body image or mental health is predicted for the BAT group as AT is expected to have a neutralizing effect on the negative mental health symptoms associated with brace treatment.

Participant rankings for function/activity, body image, and mental health are expected to become less favorable in the Obs group during the study period, but at a less severe magnitude than in the BB group (Misterska et al., 2013; Talić et al., 2016). Across all three domains of interest, the BB group is expected to report the most negative change occurring over the 12-month study (Misterska et al., 2013; Talić et al., 2016).

*Radiographs and Photographs*

Radiograph results are expected to show an increase in Cobb angle in the Obs group at a greater prevalence than in the other groups (Kalichman et al., 2016). Pictures against the grid background will likely show that those in the AT groups are more oriented toward the body’s midline than those in the non-AT groups (Caplan, 1987).
Achieving a more medially oriented posture through AT training is expected based on the work of Deborah Caplan, P.T., who utilized AT to treat AIS patients. Although there is no difference in the bones themselves, Figure 12 shows that AT training helped patients replace their old postural habits that fed into their curvature with more efficient patterns, improving their exterior presentation and internal self-image (Caplan, 1987).

**Figure 12a.** *Lateral view of patient before and after AT training*  
**Figure 12b.** *Posterior view of patient before and after AT training*

**Figure 12.** *Effects of Alexander Technique training on posture and alignment of AIS patients.* Training in AT resulted in more efficient, medially oriented postural alignment.

Images courtesy of Caplan, 1987
Discussion

Across treatment groups

All pairwise comparisons with the OAT group have the OAT participants reporting more positive results across the domains of function/activity, body image, and mental health. Past literature does not suggest that observation negatively impacts patients’ psyche (Cheung et al., 2007). This group is expected to reap the benefits of AT training without having to combat or neutralize poor body image and reduced self-efficacy as seen in the BAT group.

Positive results across the three domains are expected in the BAT group when compared to the Obs and BB groups. These results follow a similar logic to the OAT group results: both the BB and BAT groups will initially experience negative mental health symptoms due to bracing (Cheung et al., 2007; Kalichman et al., 2016; Misterska et al., 2013). However, as the treatment period progresses, the buffering effects of AT on poor mental health will manifest in the outcome measurements as significantly more positive function, body image, and mental health rankings reported by the BAT group than the Obs and BB groups.

It is expected that the Obs group experience some negative change because their curves are the most likely to progress (Kalichman et al., 2016). As the participants’ scoliotic curves become greater and more externally noticeable, it is expected that their ability to perform everyday functions and body image will worsen (Talić et al., 2016).

The BB group is expected to report the most negative change across all domains. They will experience the negative mental health effects associated with brace treatment,
but will not receive any AT training to neutralize the psychological impacts of having a spinal abnormality and wearing a rigid orthotic (Misterska et al., 2013).

**Within QoL domains**

It is predicted that the OAT group will experience the most positive change in function/activity, the BAT group will experience some positive change, the Obs group will experience some negative change, and the BB group will experience the most negative change throughout the 12-month period (Figure 10a). The OAT group is expected to experience the most positive change because the participants will be able to integrate the AT principles throughout their ADL in order to improve functional movement without being hindered by a brace (Cranz, 2019). The BAT group will also experience positive change by applying AT to their everyday functioning, but they will still feel somewhat restricted by the brace (Cheung et al., 2007). The Obs group will experience a decrease in function because it is expected that their curves become more severe over the 12-month period, subsequently impeding daily functioning. The BB group will feel the most negative change in function/activity because the brace will restrict them from moving freely, and they will not have AT training to help them find more efficient ways of functioning within the brace.

The predictions for body image and mental health are bound together, as mental health encompasses feelings associated with body image and self-efficacy (Figure 10, parts b and c). The OAT group is again expected report the most positive change, the BAT group is expected report no change, the Obs group is expected report some negative change, and the BB group is expected report the most negative change. The emphasis on
presenting options for more efficient pathways of movement in AT indicates that participants in both AT groups will find a more expansive and flexible definition of body image and greater feelings of self-efficacy (Alexander, 1932; Schultz, 2019). However, BAT group data will appear to show no change because the combination of bracing and AT will neutralize each other in the domains of body image and mental health. The Obs group will report some negative change in both domains because their curves are expected to progress, becoming more externally visible. As body image and mental health in adolescence are dependent on perceived peer acceptance, the more externally evident a patient’s spinal abnormality, the more likely they are to develop a diminished self-concept (Carli-Mills, 2018; Misterska et al., 2013; Reichel & Schanz, 2003). The BB group is expected to report the most negative change in both body image and mental health for reasons similar to the Obs group. Although ultimately their Cobb angles may not increase as drastically as those in the Obs group, wearing a brace makes their spinal abnormality more externally obvious. Their perception of peer opinion will be negative, and as a result, their internal body image and feelings of agency will decrease over the course of treatment (Carli-Mills, 2018; Misterska et al., 2013; Reichel & Schanz, 2003).

**Conclusion**

Significant results would suggest that AT as a supplement to conservative treatment for AIS yields more favorable physical, mental, and emotional health outcomes among patients, including a more positive body image and increased feelings of self-efficacy. Hopefully, this research would foster greater consideration for incorporating holistic methods of body learning and healing into Western medical practices.
CONCLUSION

Although the most prevalent, AIS is only one of several types of scoliosis, and therefore future studies should examine the effects of AT as a supplemental treatment for patients with different types of scoliosis as it occurs throughout various stages of life (Scoliosis Research Society, 2019b). Similarly, there are adults who, like Dr. Cranz and myself, were conservatively treated for AIS in their adolescence and could now subsequently benefit from training in AT to encourage a more efficient and informed use of their body. To examine the effect of AT on those with AIS as they enter adulthood, future studies should consider long-term trials, in which the amount of AT training varies from overlapping exactly with brace treatment to extending beyond the skeletal growth period of development and into adulthood.

The previously proposed study is simply the initial exploration towards more in-depth research that combines somatics and Western medicine in an attempt to bring about more holistic patient care. Future research should examine the intersections of other treatment methods from both spheres, for example, looking at surgical intervention of scoliosis and how training in AT could be beneficial during pre- and post-operative care. Further studies should also consider other orthopedic conditions and somatic disciplines, as all somatic practice encapsulates the tenets of body-mind connection, neuromuscular repatterning, and patient education and knowledge, to facilitate more favorable outcomes and holistic patient wellness in various environments (Cordova-Caddes, 2019; Lynggaard et al., 2017).
In order to pursue any of these future directions, we must merge the integrated approach of somatics with the segregated but much more broadly known Western medical world. We have to advertise to the general public that there exist efficacious methods of total-body healing. As of now, most accounts documenting the benefits of somatics exist as individual cases, including the experiences of Dr. Cranz, Dr. Cordova-Caddes, Deborah Caplan, myself, and several others whose work informed this research (Allison, 1999; Gelb, 1994; Hackney, Peggy, 2002; Knaster, 1996). Our stories represent the promise of somatics as a supplement to Western medical practices. My hope is that as the field of somatics grows, more people will become intrigued by and experience its facilitation of self-efficacy and multifaceted wellness. Although we are not quite sure of how healthcare would function with somatics and Western medicine as mainstream complements to each other, the solution for more favorable health outcomes for both AIS patients and patients as a whole relies on a multidisciplinary approach. The team for research and treatment of AIS should include somatic practitioners, pediatricians, orthopedic surgeons, psychologists, and patients themselves working harmoniously in pursuit of holistic patient care.
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## SRS-22r Patient Questionnaire

**Patient Name:** 

**Date of Birth:** 

**Today’s Date:** 

**Age:** 

**Medical Record #:** 

### INSTRUCTIONS

We are carefully evaluating the condition of your back and it is **IMPORTANT THAT YOU ANSWER EACH OF THESE QUESTIONS YOURSELF.** Please **CIRCLE THE ONE BEST ANSWER TO EACH QUESTION.**

1. Which one of the following best describes the amount of pain you have experienced during the past 6 months?
   - None
   - Mild
   - Moderate
   - Moderate to severe
   - Severe

2. Which one of the following best describes the amount of pain you have experienced over the last month?
   - None
   - Mild
   - Moderate
   - Moderate to severe
   - Severe

3. During the past 6 months have you been a very nervous person?
   - None of the time
   - A little of the time
   - Some of the time
   - Most of the time
   - All of the time

(Continued on next page)
4. If you had to spend the rest of your life with your back shape as it is right now, how would you feel about it?

   Very happy
   Somewhat happy
   Neither happy nor unhappy
   Somewhat unhappy
   Very unhappy

5. What is your current level of activity?

   Bedridden
   Primarily no activity
   Light labor and light sports
   Moderate labor and moderate sports
   Full activities without restriction

6. How do you look in clothes?

   Very good
   Good
   Fair
   Bad
   Very bad

7. In the past 6 months have you felt so down in the dumps that nothing could cheer you up?

   Very often
   Often
   Sometimes
   Rarely
   Never

8. Do you experience back pain when at rest?

   Very often
   Often
   Sometimes
   Rarely
   Never

9. What is your current level of work/school activity?

   100% normal
   75% normal
   50% normal
   25% normal
   0% normal

   (CONTINUED ON NEXT PAGE)
10. Which of the following best describes the appearance of your trunk; defined as the human body except for the head and extremities?

   - Very good
   - Good
   - Fair
   - Poor
   - Very Poor

11. Which one of the following best describes your pain medication use for back pain?

   - None
   - Non-narcotics weekly or less (e.g., aspirin, Tylenol, Ibuprofen)
   - Non-narcotics daily
   - Narcotics weekly or less (e.g. Tylenol III, Lorcet, Percocet)
   - Narcotics daily

12. Does your back limit your ability to do things around the house?

   - Never
   - Rarely
   - Sometimes
   - Often
   - Very Often

13. Have you felt calm and peaceful during the past 6 months?

   - All of the time
   - Most of the time
   - Some of the time
   - A little of the time
   - None of the time

14. Do you feel that your back condition affects your personal relationships?

   - None
   - Slightly
   - Mildly
   - Moderately
   - Severely

(CONTINUED ON NEXT PAGE)
15. Are you and/or your family experiencing financial difficulties because of your back?

   Severely
   Moderately
   Mildly
   Slightly
   None

16. In the past 6 months have you felt down hearted and blue?

   Never
   Rarely
   Sometimes
   Often
   Very often

17. In the last 3 months have you taken any days off of work, including household work, or school because of back pain?

   0 days
   1 day
   2 days
   3 days
   4 or more days

18. Does your back condition limit your going out with friends/family?

   Never
   Rarely
   Sometimes
   Often
   Very often

19. Do you feel attractive with your current back condition?

   Yes, very
   Yes, somewhat
   Neither attractive nor unattractive
   No, not very much
   No, not at all

20. Have you been a happy person during the past 6 months?

   None of the time
   A little of the time
   Some of the time
   Most of the time
   All of the time

(CONTINUED ON NEXT PAGE)
21. Are you satisfied with the results of your back management?

   Very satisfied
   Satisfied
   Neither satisfied nor unsatisfied
   Unsatisfied
   Very unsatisfied

22. Would you have the same management again if you had the same condition?

   Definitely yes
   Probably yes
   Not sure
   Probably not
   Definitely not

Thank you for completing this questionnaire. Please comment if you wish.

3-10-06

END