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Bodywork Impact on Posture and Related Awareness in Teenagers

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Abstract

Purpose:
To determine the impact of bodywork on posture related awareness in a teenager.

Material & Method:
This is a single case study of a fourteen-year-old male. Seven sessions were provided over approximately a four-month time frame. Measurement of posture improvements primarily focused on the head with craniosacral assessments and related exercises. Sessions provided ranged from 30-60 minutes in length and combined muscle, myofascial, passive range of motion "(PROM") and other bodywork techniques.

Results:
The results of the study show a 100% improvement in level eye lateral movement after each session. Other improvements were noted with lateral head rotation, balance in craniosacral rhythms and weight distribution. The client also experienced improved ease and effortlessness in his posture both in sitting and standing when receiving work on psoas work in a supine position. Postural changes experienced by the participant lasted approximately twenty-four hours. In addition, the participant demonstrated improved postural awareness in his day-to-day life by incorporating regular neck stretches to support better postural patterns. These patterns continued to improve as of the report date.

Conclusion:
The results indicate a positive correlation between bodywork and postural patterns and related awareness in teenagers which may be beneficial to expand on in future studies.

Key Words: Massage, Cranial Sacral, Posture, Adolescent

Introduction

Posture imbalances, defects and related compensations can lead to misalignment patterns that may impact the optimal function of individuals throughout their life. Although many factors can impact posture such as trauma or a muscular skeletal deformity, some of the primary considerations are womb positioning, and development of imbalances from interacting in day-to-day life (e.g. sitting,standing, sleeping).

Form will dictate function, and when postural form is compromised in some way, a related dysfunction will eventually follow. The length of time and how the dysfunction may manifest varies with each individual and may include but is not limited to pain in the spine and related structures, internal organ displacement and less than optimal functioning of the circulatory and respiratory systems (Rusek, et al., Children 2021, 8, 288). In addition, postural dysfunction from a forward head position has been associated with arthritis, back pain, carpal tunnel syndrome, constipation, decreased lung capacity, decreased quality of life, depression, fatigue, headaches, heart disease, increased blood pressure, indigestion, neck pain, neurological problems, poor circulation, shortened life span and temporomandibular joint disorder (Whitten, September/October 2017).

A unique quality with most teenagers is that their bodies are experiencing periods of dynamic change and growth. In addition, teenagers are in the process of becoming more independent and self-sufficient. Developing body awareness in this stage of development can provide teenagers the opportunity to gain kinesthetic awareness of optimal postural patterns for their bodies to grow into and integrate into all areas of their life. This case study focuses on how bodywork supports teenagers in both improving posture and becoming aware of optimal postural patterns.

Background

According to data from the study conducted in Poland, 34-50% of children and adolescents exhibit different degrees of incorrect posture. One of the critical periods of postural development noted in the article was puberty (Rusek, et al., Children 2021, 8, 288). Both increased periods of prolonged sitting and technology usage combined with a decrease in physical activity is contributing to the growth of dysfunctional posture patterns among teenagers. According to a study done in Italy, 65% of high school students had non-physiological musculoskeletal conditions (Francesca Maria Trovato, 2016).

Head Posture Considerations in Teenagers

While posture compensations and imbalances can originate in any area of the body, research has shown that how the head rests on the spine has a significant impact on postural patterns. Two ways in which this can manifest is poor habits in

utilizing technology, and imbalances that present in the muscle skeletal development of muscles associated with mastication. Teenagers can have multiple factors impacting head position including orthodontal work and the high number of hours spent viewing screens through both handheld mobile devices and stationary structures. The body can develop compensating dysfunctional patterns as a result of poor head posture, which in turn can contribute to long term problems.

Research from the *Journal of Orthopedic and Sports Physical Therapy* indicates the resting position of the mandible is a key consideration for maintaining optimal positioning of the head and balancing the mastication muscles, hyoid bone, and post cervical musculature. The resting jaw muscles must be balanced with the mandible suspended from gravity and with opposing teeth having light to no contact. The ideal alignment of the teeth occurs when they are held in a relaxed and balanced manner by the muscles impacting the head's alignment (Ayub, 1984).

According to articles published by John Upledger, DO, OMM (Upledger, May 29, 2009) and Nancy Burke, B.A. C.M.T (Burke, Spring 1998) orthodontic appliances can impact and trap the placement of the maxilla, sphenoid, temporal, mandible, occiput, and indirectly other bones of the skull. In addition, they noted that orthodontic work can reduce and stop the cranial sacral rhythms, especially those devices that cross the midline. The research suggests that orthodontics can createsystemic issues in the body such as contributing to patterns of scoliosis and pelvic imbalances. In a case study performed by John Upledger, there was a direct correlation with the sacrum mimicking issues in the occiput being triggered by braces that were restricting craniosacral rhythms. Other research also supports the benefit of receiving craniosacral work both during and after receiving orthodontal work in maintaining and reestablishing craniosacral rhythms.

In addition, the average teenager spends a significant number of hours a day in front of electronicdevices, which increases the risk of developing forward head posture ("FHP") or "text neck". According to an article in the *American Massage and Bodywork*, "text neck" is now being called an epidemic with nearly 60 percent of Americans at risk of developing this problem (Whitten, September/October 2017). Musculoskeletal dysfunctions that can occur as result of FHP are hypertrophy of the upper trapezius, and hyperkyphosis with the scapula moving from the midline protracted. In addition, the upper cervical extensors can shorten (related deep flexors lengthened), and the lumbar spine can hyperextend contributing to a pelvic tilt. Spine erectors and hip flexors can also become tight.

Postural Compensations in Teenagers Prolonged Sitting and Backpacks

Teenagers spend a significant portion of their days sitting behind desks, doing homework, and carrying weighted backpacks throughout the day. Prolonged sitting can contribute to hypertension in hip flexors, and compensating postural patterns can develop to support carrying heavy loads.

Method

Client History

The case study is a fourteen-year-old Caucasian male with an active lifestyle. Prior accidents include stitches on his chin when he was approximately age four from falling on concrete and a bike accident crash at age eight resulting in injuries along the left side of the body (ribs, elbow) fromsliding into the ground. At the start of the case study the client had just had a mara removed to help correct an overbite. The mara was in his mouth for approximately 15 months and he continues to use braces to move his jaw into alignment.

During 2020, the client attended school online resulting in approximately 4-7 hours of daily screentime. The client utilizes a standing desk and alternates between sitting and standing while studying. The client balances out screen time with 90-120 minute workouts most days consistingof combinations of resistance training, running, agility drills, weightlifting, high intensity intervaltraining ("HIIT") and mountain biking. In August 2021, the client returned to school full time, increasing the average amount of time sitting per day to approximately 8-10 hours between classroom, homework and transportation time. In addition, the client began carrying a backpackthroughout the school day.

The client's treatment goals are to continue to develop and maintain good posture throughout theday, especially when he is tired. His posture becomes aggravated when he is sitting or bending down for long periods of time (e.g. in front of computer screen, elbows on knees while sitting) which is alleviated when he leans on a chair or couch. Discomfort can manifest in his neck and lower back. At times, client experiences dizziness when lying on his back.

Assessment Measures

Pictures were taken at the start of the case study and at the presentation date. Initial images show the developing pattern of FHP and related hyperkyphosis present and a slight pelvic rotation. In addition, both feet have lateral rotation and slight plantar flexion. Scapulas present with slight abduction and an elevation on the right side. When lying in a supine position the client's head presents with a slight flexion to the right. Craniosacral rhythms were assessed at the beginning and end of each session by the practitioner, noting any changes in Symmetry, Quality, Amplitude and Rate ("SQAR" assessment).

In addition, osteopath and craniosacral practitioner Hugh Milne discusses exercises that demonstrate the connection between the lateral rotation of the head, jaw and eyes and how each ofthese movements may impact weight transferred on the foot (Milne, 1995). Milne notes how mostof the eye muscles attach to the sphenoid, which is considered to be the central bone of the cranium.From his perspective, "as the eyes begin to move, the sphenoid and rest of the body follow." These exercises were used as assessments.

The client was asked to separately perform each of these exercises directly before and after eachsession. The actions performed were lateral rotation of the neck to the left

and right, movement of the jaw from left to right, and looking to the left and right with the head facing forward. The client provided information regarding tension and discomfort in general and in relation to the opposite side in performing each of these motions.

Lateral head rotations restrictions or compensations were noted as either none, slight, moderate, or severe based upon the parameters summarized below.

	Lateral Head Rotation (90°)	Restriction/Compensation
None	90°	None
Slight	90°	Yes
Moderate	45-90°	Yes
Severe	0-45°	Yes

In addition, the client provided information of any awareness regarding how the movements mayhave impacted weight transfer into his feet. The practitioner observed the motion for any visual compensating patterns that presented in performing each of these actions. The differences experienced by the client and noted by the therapist are summarized in *Exhibits 1 and 2*.

Treatment Plan

The client preferred to receive work fully clothed, refused the use of oils and initially requested the session lengthnot be longer than 60-minutes and be closer to a 30-minute duration. Sessions were initially provided every 1-2 weeks between 6/10/21-7/25/21 resulting in five sessions being completed once accommodations were made for vacation schedules. The client returned to in person learning at school during August 2021 and two additional follow up sessions were provided on 9/12/21 and 9/19/21. A total of seven sessions were provided to the client during the duration of the casestudy.

The treatments provided combined craniosacral techniques and related diaphragm releases with postural related muscular skeletal, myofascial and other bodywork methods. The treatment goalwas to explore a variety of different techniques and methods that would support the client's posture and related awareness. Specifically, bodywork that focused on releasing primarily tight postural muscles noted by John Gibbons (Gibbons, 2014), and the diaphragm and psoas importance discussed by Thomas Meyers (Myers, January/February 2019) were incorporated in all sessions beginning with Session 2. The related muscular imbalances associated with forward head posturethat may present as a contracted state on the anterior side of the upper body as discussed by Joe Musulino (Musculino, September/October 2021) were explored beginning with Session 5. See summary of session notes beginning on page 13 for details.

In order to support the cranial rhythms and relax the cranium and jaw, the intention was to provide craniosacral treatment at the beginning of each session and incorporate other bodywork techniques during the last half of the session. Craniosacral work was performed at the beginning of all sessions with the exception of the last session which

explored side lying position for the complete sessionother than listening to the craniosacral rhythms. It was also recommended that the client incorporate neck stretches (slight chin tuck) into daily activities.

Results

The images below represent the change in the development of a forward head posture pattern from the start of the case study up to the case study presentation date. The last bodywork session wasreceived by the client on September 19, 2021. Client continued to integrate stretches and related postural awareness corrections throughout his day-to-day activities both during and after the case study was completed.

Photo taken 6-5-21

Photo taken 12-13-21

Results of session observations and assessments were a 100% improvement in Head Rotation, Eye Movement Level, Cranial Rhythm Symmetry, and Weight Distribution. Additional information is summarized in the following pages.

Improvements noted in the craniosacral rhythms and exercise markers are summarized in ***Exhibit 1*** which should be read with the understanding of a 100% improvement in Head Rotation, Eye Movement Level, Cranial Rhythm Symmetry, and Weight Distribution. If no problem or restriction was noted in the area assessed at the beginning of each session and there was no change, then the information was excluded from the chart above.

As summarized above, the client experienced improved lateral head rotation, leveling of lateral eye movements, cranial rhythm symmetry and balanced weight distribution 100% of the time when animbalance was noted at the beginning of the session.

Exhibit 1 - Craniosacral Assessment Results Summary:

This chart summarizes the changes noted in craniosacral rhythms and related exercise assessments as discussed in assessment measures on pages 5 and 6. The first column lists the assessment marker with the remaining columns summarizing observations noted during sessions 1-7 for each marker.

	1	2	3	4	5	6	7
Head Rotation	**a**	**a**	**a**	**a**	**a**	**a**	**a**
Jaw Movement	-	-	-	-	-	-	-
Eye Movement	**b**	**b**	**b**	**b**	**b**	**b**	**b**
Symmetry	**c**	**c**	**c**	**c**	n/a	**c**	**c**
Quality	*	*	*	*	n/a	*	*
Amplitude	*	*	*	*	n/a	*	*
Rate	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Weight Distribution	-	-	-	-	-	-	**d**

Key:
a – Lateral rotation of neck changed from slight restriction before session to none after session
b – Eye lateral movements changed from inferior on both sides prior to session to level after session
c – Improved balance of craniosacral rhythms at the end of session (stronger in right at start)
d – Improved weight distribution from left prior to session to even in both feet after session
*** –** No changes noted at beginning and end of session
- - No restrictions or imbalances noted before or after sessionn/a - not measured

The improvements noted by the client are summarized in ***Exhibit 2*** While the primary focus of the study was the impact of work performed on the client's posture and related awareness, other observations and comments provided by the client were summarized for additional information. Two patterns seemed to present with the client's experience and a specific area of work or position, specifically psoas work and side lying position.

The client experienced improvements in his posture in every session where psoas work was performed in a supine position. The client reported that sitting and standing were effortless, and he felt supported through the center of his body. This feeling usually lasted twenty-four hours after the session. In addition, the client was more easily able to relax in

a side lying position. In sessions 6 and 7 where either a portion of or the entire session was provided in side lying, the client experienced relaxation both during and after the session.

The client also provided information regarding how sessions impacted dizziness sometimes experienced when lying supine without a pillow and their feeling of confidence. Please review page 16 for additional discussionof these observations noted.

Exhibit 2 - Client Experience Results Summary:

This chart summarizes the client's feedback regarding subjective changes experienced before and aftereach session.

	1	2	3	4	5	6	7
Improvements:							
Posture	-	a	a	-	a	a	-
Dizziness	b	b*	-	b	b	b	-
Confidence	*	*	*	*	*	c	*
Relaxation	*	*	*	d	*	d	d

Key:
a – Client experienced an increase in ease and effortlessness in holding his posture in both sitting and standing. The client reported his body felt "empty and light" and "supported like a steel rod" was running through the center of his body and his muscles were holding him up. This feeling lasted approximately 24hours. The client experienced this change in all the sessions where psoas work was performed from a supine position.
b – Client experienced some dizziness lying supine and needed a pillow under his head.
b*– Client experienced improvement from prior week and almost no dizziness without pillow. Pillow stillutilized for maximum comfort.
Red - Recent orthodontal adjustment
Green - Side lying entire session
c – Client experienced feeling more confident
d – Client felt more relaxed after session. Note in session 7 client fell asleep while receiving work.
– No changes noted at beginning and end of session
– No restrictions or imbalances noted before or after session

Summary of Sessions

June 10, 2021 – Session #1 – Introduction to Methods to be Used and Assessing Client's Comfort Level

This session was an introductory session for the client introducing him to how sessions were going to be structured, starting with craniosacral and then moving into other bodywork areas. Space was created for the client to ask questions and be completely comfortable with areas to be worked andwas kept to 30 minutes per the client's request. The focus on the session was to introduce the client to what to expect with craniosacral holds and the related diaphragm releases associated with receiving craniosacral work. An assessment of the client's comfort level receiving muscular workaround the neck area was also performed.

Cranial rhythms were assessed at the beginning and end of the session. Client had slight lateral flexion of the chin to the right and slight lateral rotation in bothfeet and plantar flexion. Client had more difficultly performing lateral neck rotations to the left side. Client was introduced to the following cranial holds: Sutherland, frontal, parietal, sphenoid,temporal, mandible, and others. Diaphragm releases were performed on the pelvis, diaphragm, pectorals, hyoid, and occiput. Pelvic diaphragm had an inferior restriction which released. Clientwas introduced to muscle work around the neck via a trigger point assessment of the sternocleidomastoid ("SCM"). No trigger points were noted in the SCM.

Client experienced dizziness when lying supine and needed a pillow to be comfortable. Client wascomfortable with all the procedures and areas worked and agreed to receive further sessions.

June 18, 2021 – Session #2: Craniosacral & Massage (Neck, Diaphragm, Psoas)

This session was 60 minutes in duration with the time split between craniosacral work and muscular work in the neck, psoas, and diaphragm areas. Cranial holds focused on the temporals,mandible (felt locked) and sphenoid. In the neck the digastric muscle was focused on to help relax and release muscles associated with mandible retrusion, as well as the SCM which impacts posture, excessive forward head posture and a variety of other neck related issues.

Research noted by Thomas Meyers in the "The Core at Your Core *the Psoas-Diaphragm Connection"*(Myers, January/February 2019) emphasizes the importance in balancing the diaphragm and psoas to support balance. To explore the potential benefits of this for the client, muscular and fascia releases were performed on the psoas and diaphragm, noting the right psoas muscle was tighter and more difficult to access then the left.

In addition, tight muscles identified as predominately postural by osteopath John Gibbons (Gibbons, 2014) when viewing sagittal alignment were also assessed and worked, based upon the postural pattern presented by the client. These primarily included the iliopsoas and neck extensors. The muscular and facia lines of the hamstrings were also worked to balance work performed on hip flexors. The client did not experience any discomfort working on the hamstrings and no significant tightness was noted.

Client noted that his body and feet felt "lighter" and that it was easy to stand and sit "effortlessly". This change lasted approximately one day.

July 4, 2021 – Session #3 Craniosacral & Massage (Neck, Diaphragm, Psoas)

This session was 60 minutes in duration and followed a similar format from the previous session to note any differences. Cranial work expanded to include other holds in the Upledger protocol, with the primary holds still focused on temporals, mandible and sphenoid. Muscular work included posterior neck work, especially on the upper cervical extensors and will as continued work on thedigastric, SCM, diaphragm, psoas and hamstrings.

Client felt more supported in the midsection, stating it was easier to sit and stand and felt like a "rod" inside his body was supporting him. This change lasted approximately one day.

July 16, 2021 – Session #4 Craniosacral (Ct received Orthodontal Adjustment 2 days prior to session)

This session was 45 minutes in duration. The client received an orthodontal adjustment 2 days prior to the session and was still experiencing discomfort in his month especially in the middle lower left teeth. Only craniosacral work was performed to help support the cranial rhythms withthe recent adjustment. Upledger protocol was performed with tightness noted in the lower pelvicdiaphragm.

Client felt some relaxation in the jaw and was still dealing with discomfort from the orthodontal adjustment.

July 25, 2021 – Session #5 Craniosacral & Massage (Diaphragm, Psoas, Pectoralis, Serratus Anterior)

This session was 45 minutes in duration. Client was restless for session and was too fidgety to assess craniosacral rhythms and work within the cervical regions. Diaphragm releases were performed on pectorals, respiratory and pelvic areas noting the pelvic diaphragm area pulled to theleft. As noted in the article written by Yoni Whitten, "The Posture Window" (Whitten, September/October 2017), contracted anterior upper body muscles can contribute to a FHP pattern and this session (and subsequent sessions) began to incorporate work in this area. The sessionfocused on muscular and fascial related releases on the trunk, shoulders, pectoralis and hips. Similar muscles were worked as in previous sessions with additional focus on the serratus anterior and passive range of motion ("PROM") stretching on the shoulders to address slight shoulder abduction. The psoas continued to be tighter on the right and difficult to access and more easily accessible onthe left side. The serratus anterior on the left side was tighter than the left. The client enjoyed thePROM stretches in the shoulder noting that the left side had more movement than the right.

Client felt “empty, light and more confident” after the session and a supportive “rod” running through the center of his body. This change lasted approximately one day. In addition, it was noted that even though craniosacral holds were not performed the client still had improvement in neck rotation and the leveling of eyes at the end of the session.

September 12, 2021 – Session #6 Craniosacral & Massage (Neck, Diaphragm, Psoas, Pectoralis, Serratus Anterior, Calves)

This session was 60 minutes in duration. Cranial holds performed were Sutherland, sphenoid, temporal, mandible and ear pull. An inferior pull was noted in the pelvic diagram on both sides.Muscular and myofascial releases were performed in the neck, SCM, scalenes, anterior neck, psoas, serratus anterior, hamstrings and calves/ankle muscles.

The client reported feeling “more relaxed, more confident, straighter” and a sense that his body was holding himself up. The client liked the work performed in the neck area. The client had difficulty relaxing supine and felt dizzy without a pillow. A note was made to explore side lying more fully in the next session as a possible more comfortable position for the client.

September 19, 2021 – Session #7 Massage Side Lying (Lateral Shiatsu Lines, Trunk, Neck, Psoas)

The session was 60 minutes in duration. Cranial sacral rhythms were assessed but no cranial holdswere performed to minimize dizziness that sometimes surfaced with the client lying supine. The session was performed in a side lying position on a massage table to increase comfort and relaxation for the client. The client liked side lying, experienced no dizziness and was able to relax and fallasleep during the session.

Lateral shiatsu lines were worked along both sides of the client’s body with mother-son compressions. PROM and related stretching were performed on both shoulders. Muscular and fascial release work was performed along the serratus anterior, intercostals, pectoralis, subclavius, posterior and anterior neck muscles. Psoas muscles were stretched from the side with the client feeling the connection between the lower lumbar and the trochanter attachment sites.

Client felt relaxed and open after the session. In all the sessions received the client was able to relax his nervous system the most in side lying position.

Discussion

Although the original intention of the study was to provide consecutive weekly sessions, summer travel plans, transitioning back to school full time in person and other conflicts impacted the continuity and timing of sessions. Seven sessions were completed during the study. The first five sessions were provided approximately 1-2 weeks apart. A month break was taken after the start ofthe school year and then the last two sessions were scheduled one week apart. In addition, the duration of the sessions fluctuated depending

on the client's disposition and preference with each session ranging from 30-60 minutes. Several factors impacted the client's disposition during sessions, including his ability to relax, and adequate movement and food consumption prior to receiving the session. Sessions provided where the client showed up having worked out and eaten prior to the session and reflected the client's ability to relax into the session resulted in the client receiving 60 minutes of work. Theinconsistency in the frequency and duration of treatments may have impacted the results of the study.

The client also received orthodontal adjustments throughout the study which may have impacted results. As noted in ***Exhibit 2,*** the client experienced improvements in dizziness while lying supine during the first three consecutive sessions with the third session, resulting in him being able to lie supinewithout a pillow and experiencing no dizziness. On the fourth session the client received an orthodontal adjustment a couple days prior to his session and the dizziness lying supine without apillow returned. It would be interesting to perform additional bodywork studies regarding the pattern of potential dizziness and how it relates to the timing of orthodontal adjustments and when the orthodontal appliances are removed from the client's mouth.

The client was introduced to side lying work for a portion of the sixth session and for most of theseventh session. It was noted that the client was able to relax more easily in this position and seemed to make his body more receptive to receiving work. If more time was available, it would have been interesting to continuing working in side lying position more fully and working with Thai and Shiatsu lines. In addition, more sessions may have provided time to explore incorporating myofascial lines as illustrated by Thomas Myers in "*Anatomy Trains*" into the postural patterns presenting in the client. It was recommended that the client consider receiving future work in these areas.

Although it was not specifically measured for this case study, client feedback indicated that at times work received helped him relax and feel more confident. These may be areas of future interest andstudy regarding how bodywork impacts stress and confidence in teenagers. It was also noted thatthe client's awareness of his body, specifically how his head was resting on his spine, started to beincorporated into his day-to-day activity. The client reported integrating neck stretching exercises(slight tucking of chin) to lengthen his upper cervical extensors and was observed by his parentsmaking corrections on his posture throughout the day at home.

Conclusion

Despite the inconsistencies in treatment, duration and the limited number of sessions provided, itwas noted that bodywork received improved the client's posture both in measured markers and kinesthetic awareness and integration by the client. Regardless of what type of bodywork was performed, it was noted that the client's lateral eye rotation on both sides improved 100% of the time from looking inferior at the beginning of each session to level at the end of the session. The exercises assessments used during the study may be a useful tool to help identifysubtle changes received from craniosacral and other bodywork. The results also show improvement in lateral rotation of the neck, improved balance in craniosacral rhythms and weight distribution.It was also noted that

work performed on the deep postural psoas muscle in a supine position hadthe greatest impact on client's kinesthetic awareness of feeling supported by his body with posture feeling easy and effortless both in a sitting and standing position. This feeling usually lasted approximately twenty-four hours. More sessions and additional types of bodywork will need to be explored in the future to assess additional benefits. Inaddition, the client incorporated neck stretches into his day-to-day routine to help support an improved postural pattern with how his head was resting on his spine.

Due to the significant number of changes and growth occurring during teenage years and the potential impact postural patterns may have on a variety of long-term health related issues, it is recommended that additional studies be performed regarding the potential preventative benefits of providing bodywork to support healthy postural pattern development and related awareness in teenagers.

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