



Clinical Case Report Competition

West Coast College of Massage Therapy

Spring 2010

First Place Winner

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The effects moderate pressure Swedish massage therapy in
reducing anxiety relating to post traumatic stress disorder
among girls in the juvenile justice system

The Effects of Moderate Pressure Swedish Massage Therapy
in Reducing Anxiety Relating to Post Traumatic Stress Disorder
Among Girls in the Juvenile Justice System

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INTRODUCTION.....

Hypothesis: Moderate pressure Swedish massage therapy reduces anxiety relating to Post Traumatic Stress Disorder (PTSD) among girls in the juvenile justice system.

PTSD among girls in the juvenile justice system was studied by Rubin in 2000. According to his study, “Teen Quest: Female–Specific Program Services for Colorado’s Delinquent Girls,” 100% of the incarcerated teen girls had PTSD. The study “Post Traumatic Stress Disorder Among Female Juvenile Offenders” published by the Journal of the American Academy of Child and Adolescent Psychiatry showed 70% were exposed to some form of trauma while 65% experienced symptoms of PTSD at some point. (Cauffman, Feldman, Waterman, & Steiner, 1998)

Post Traumatic Stress Disorder: PTSD is an anxiety disorder which is onset by exposure to a violent or traumatic event. According to the United States department of veteran affairs (USDVA, 2009), it is characterized by the appearance of chronic symptoms which persist over an extended period of time. Symptoms may appear immediately after the event, or take months and sometimes years to surface. The duration of the symptoms varies from person to person and symptoms may be constant or intermittent over the course of many years. Some events that may cause the onset of PTSD include:

- Combat or military exposure
- Childhood sexual or physical abuse
- Sexual or physical assault
- Terrorist attacks
- Serious accidents
- Natural disasters

The USDVA asserts that one in three people who experience a serious trauma will develop PTSD. The likelihood of developing the disorder depends on a number of factors, some of which include:

- How serious the trauma was
- If they were hurt
- If someone they know was hurt or killed
- How close they were to the event
- How strong their reaction was
- How much support they received after the event

Diagnosis of PTSD is usually made by a mental health professional and is based on several elements. Symptoms include:

- Re-living the event: People may experience frightening images, nightmares, and flashbacks which can induce physical symptoms such as sweating and raised heart rate.
- Avoiding: People will avoid contact with others who were involved, avoid situations that remind them of the event, and avoid talking about the event.
- Numbing: Some people have difficulty expressing emotions or feelings and cannot remember some of or the entire event.
- Hyper-arousal: People become jittery, alert and paranoid. They may become irritable and have difficulty concentrating on tasks.

In order to be considered PTSD, these symptoms must persist for at least one month. Also, patients must have at least one re-living symptom, two hyper-arousal symptoms, and three avoidance symptoms. These symptoms make functioning in everyday life and social situations difficult and sometimes impossible (Smith, Segal, & Segal, 2008).

There are several methods currently used to treat PTSD. One option is therapy in which people diagnosed with PTSD can take part in, for example, trauma-focused cognitive-behavioral therapy or family therapy. Both types of therapy involve meeting with a mental health professional and working through issues caused by the trauma. Another treatment option is Eye Movement Desensitization and Reprocessing (EMDR) that combines cognitive-behavioral therapy with eye movements and other forms of stimulation to restore the brain's information processing system, which is believed to stop functioning properly in times of extreme stress. One other treatment option for PTSD is medication. Selective serotonin reuptake inhibitors (SSRI), such as the antidepressants Prozac and Zoloft, are commonly used to treat symptoms of PTSD; however, they will not cure the disorder as they do not treat the cause. (Smith, 2008)

The Effects of Swedish Massage Therapy in Reducing Anxiety: Research has shown that massage therapy has a positive effect on biochemistry. In one study, patients exhibited several changes after receiving massage treatments. Urinary samples indicated that patients experienced a reduction in cortisol levels. Also, an increase of over 25% was seen in both dopamine and serotonin levels (Field, Hernandez-Reif, Diego, Schanberg, & Kuhn, 2005).

Neuroendocrinology: Most people with PTSD show a low secretion of cortisol and high secretion of catecholamine in urine, with a high norepinephrine/cortisol ratio. This is in contrast to the normal fight-or-flight response, in which both catecholamine and cortisol levels are elevated after exposure to a stressor (Mason, Giller, Kosten, Harkness, 1988). With brain catecholamine levels low, and corticotropin-releasing factor (CRF) concentrations high, these findings suggest irregularity in the hypothalamic-pituitary-adrenal (HPA) axis. Given the fact that cortisol is suppressed to dexamethasone in PTSD, HPA axis abnormalities are likely predicated on strong negative feedback inhibition of cortisol itself, likely due to an increased

sensitivity of glucocorticoid receptors (Yehuda, 2001). It has also been noted that people suffering from PTSD show up to a 20% decrease in the size of the hippocampus. The hippocampus plays an important role in memory, learning, and spatial navigation (Carlson, 2007). Response to stress in PTSD could be associated with long-term exposure to high levels of norepinephrine and low levels of cortisol. In contrast, this pattern is associated with improved learning in animals. Translating this reaction to human conditions gives a pathophysiological explanation for PTSD by a maladaptive learning pathway to fear response through a hypersensitive, hyper-reactive and hyper-responsive HPA axis (Yehuda, 2002).

Studies by Steiner et al. (1997) have shown that the majority of females in juvenile detention centers suffer from PTSD. U.S statistics show that in some detention centers, up to 100% of the girls showed symptoms of the disorder. One sample of juvenile detainees showed that girls were 50% more likely to suffer from PTSD than the equivalent male population. The study also found that while boys were more likely to have witnessed a traumatic event, girls were more likely to have been the victim of violence (Steiner, Garcia, Matthews, 1997).

There are two fundamental reasons why massage therapy would be a safe and effective method of treating PTSD. First of all, it helps treat both the cause of the disorder and the symptoms. Massage reduces symptoms of anxiety which are onset by the disorder (Smith, 2008). It also acts as exposure therapy for therapeutic touch which can be especially helpful in cases dealing with physical or sexual assault. In this particular case study, one of the goals was to help the girls establish personal boundaries within areas of comfort and safety.

SUBJECT CASE HISTORY.....

Background: The pilot study and case study takes place at the Burnaby Youth Custody Services Centre (BYSC) in the Aspira Unit for female adolescents.

Pilot Study April 2009: A preliminary pilot study was conducted in which the Primary Intern Massage Therapist gave weekly 15-minute Swedish chair massages from April 26 to June 9th, 2009. The Primary Intern was accompanied by Justina Krecsy, Elizabeth Fry Volunteer Coordinator for BYSC.

Her insight and advice to be consistent with the weekly schedule—to build the girls’ trust as they may have a difficult time connecting with people—helped in creating the treatment protocol and designing the Questionnaire. See Appendix 18 for a sample.

The pilot test allowed the Primary Intern to establish a professional presence and working rapport with staff and massage participants (inmates). According to State-Trait Anxiety Inventory for Adults Sampler Set Manual, Test Booklet and Scoring Key by Charels D. Spielberger, building a trust relationship with the massage participants in the Pilot Test proved to be an asset for the Case Study in regards to truthfulness of the S.T.A.I test answers. Some individuals may be reluctant to admit negative characteristics seeing them as signs of weakness. To remedy this, the researcher needs to establish a trusting relationship with the participants by sincerely communicating that their honest responses will be the most helpful and effective.

Restrictions in conducting surveys included that no questions were to be asked relating to the inmates’ charges or crimes and no questions regarding physical or sexual assaults as these can be triggers. According to BYSC Director Andrew Kronkite, “You can safely assume 100% have experienced one if not both.”

Primary Case Study: A 16-year-old female who is incarcerated for an undisclosed period of time. On her questionnaire, she indicated she had been clinically diagnosed with both anxiety and depression with no other diagnoses included. She indicated her stress to be a one on a scale of one to five, one being “strongly disagree” and five being “strongly agree”. She “somewhat agreed” that she was feeling sad, withdrawn or depressed and answered “neutral” when asked if she startled easily or if she felt she was grieving the loss of someone or something. She “strongly agreed” that she was re-living a traumatic event in her mind and “somewhat agreed” that she re-experienced these events with intrusive thoughts, flash backs or nightmares. Regarding anxiety she reported that her issues included addiction, aggressiveness, anger and eating too much. On a one-to-five scale, one being “never” and five being “very often”, she indicated she experienced anxiety and anger “very often”. Regarding if she ever experienced feelings of aggression with others she indicated “often”. Regarding falling asleep or staying asleep her response was “often”. She indicated that she has “never” intentionally hurt herself.

ASSESSMENT.....

The Touch Institute of Miami School of Medicine has conducted many studies on the effects of massage on anxiety and depression. These studies have often used, either alone or in combination, the following tests: the State-Trait Anxiety Inventory (STAI), the State Anxiety Inventory for Children (STAIC), and the Profile of Mood States (POMS) for the psychological. Physiological tests include salivary and/or urinary cortisol levels as measures of stress hormone production (Field, Morrow, Valdeon, Larson, Kuhn, Schanberg, 1992).

This case study's main assessment tool was the STAI for Adults (See Appendix 22), published by Mind Garden Inc. and created by Charles D. Spielberger (1983). It is an instrument for measuring anxiety in adults and to differentiate between temporary and emotional state anxiety versus long standing personality trait anxiety in adults. Although the STAI was developed for use with high school and college students and adults, it has been useful with junior high school students or those with a minimum sixth grade reading level. The instrument is divided into two sections, each having twenty questions with four-point Likert style available answers and can be completed in about ten minutes. The first subscale measures state anxiety, the second measures trait anxiety. The range of scores is 20-80; the higher the score indicating greater anxiety.

The Questionnaire: Due to the complexity of this case study group, restrictions on personal questions and time constraints, a case study Questionnaire based on John S. Uebersax's article, Likert Scales: Dispelling the Confusion. (Uebersax, 2007) was implemented in place of the standard History Form/Intake Form. The Questionnaire recorded information about, medications, stress levels, diagnosis and assessment of PTSD symptoms and how participants' exhibit stress. See Appendix 19 for completed Questionnaires.

Intake Form: The Intake Form was created based on information derived from the Questionnaire. It was designed to track any changes in the participants stress levels, behavioural or sleep changes throughout the week and to record outcome markers of blood pressure and heart rate before and after the massage. Home care exercises, stretching and diaphragmatic breathing was also recorded here before and after each participant's massage.

Visual Analogue Scale (VAS): The VAS was used as a Stress Scale. It was based on the Faces Pain Scale Revised (FPS-R) which, according to Carl L. von Baeyer, Ph.D., Professor of Psychology & Associate Member in Pediatrics University of Saskatchewan (2007):

“It is easy to administer and requires no equipment except for the photocopied faces. The absence of smiles and tears in this faces scale may be advantageous. The FPS-R is recommended for use with younger children in parallel with numerical self-rating scales (0-to-10) for older children and behavioural observation scales for those unable to provide self-report.”

The massage participant VAS Stress Scale answers were recorded on their Intake Form before and after each massage.

Pressure/Touch Scale: This was derived from the Pain Scale from West Coast College of Massage Therapy (WCCMT) course notes and Clinical Massage Therapy-Understanding, Assessing and Treating Over 70 Conditions (Rattray, 2000). The Pressure Scale was read aloud to each massage group before the massage started.

Thirty Minute Swedish Chair Massage Sequence: This over-the-clothes massage was created for the case study from WCCMT Manual Skills One and Two course notes and Clinical Massage Therapy-Understanding, Assessing and Treating Over 70 Conditions (Rattray, Ludwig, 2000).

Blood Pressure and Heart Rate: Moderate pressure massage elicits a parasympathetic nervous system response (Diego, Field, 2009). The parasympathetic nervous system is responsible for the reduction of heart rate and blood pressure (Tortora, Derrickson, 2006). The massage participants' blood pressure and pulse were recorded on the Intake Form before and after each massage.

Home Care: Stretch and Strength: Pectoralis stretching and rhomboid strengthening were chosen as home care exercises to complement diaphragmatic breathing and to encourage postural awareness. See Appendix 18 for handouts. With postural dysfunctions, patterns of tightness and weakness emerge once the muscle type is known. For example, the pectoralis muscles are postural, shortening in response to disuse, while the rhomboids are phasic and weaken under stress. The combined action of these two muscle groups at the shoulder girdle leads to hyperkyphosis (Rattray, Ludwig, 2000), causing less efficient breathing.

Diaphragmatic Breathing: Under stress, breathing becomes more shallow and apical as the body attempts to increase oxygen intake. Diaphragmatic breathing is a key part of every massage treatment and one of the easiest ways for the client to achieve relaxation. (Rattray, Ludwig, 2000) Homecare was recommended to each massage participant after every treatment. (See Appendix 18 for handouts)

Journals: Journals were given to the massage participants to record aggression and anxiety levels and the quality of sleep before the study started for baseline measurements and during to record any changes. Journaling was recommended to each massage participant after each treatment.

Supervisor Unit Checklist: The unit checklist was created for the S upervisors to record positive or negative behaviours every day during the case study. See Appendix 18 for chart.

TREATMENT.....

Primary Treatment Goal: The Primary Goal is to perform moderate pressure Swedish massage therapy to reduce anxiety relating to post traumatic stress disorder among girls in the juvenile justice system.

Primary Treatment Rationale: The rationale for massage therapy reducing anxiety was based on studies done by The Touch Research Institute on the positive effects of massage therapy on biochemistry including decreased levels of cortisol and increased levels of serotonin and dopamine. (Field et al., 2005)

It was reported that hospitalized child and adolescent psychiatric patients who received daily 30-minute massages for a five-day period were less anxious as measured by the STAIC for Children and less depressed as measured by the POMS. Salivary and cortisol levels used as a measure of stress hormone levels were also reduced. The decrease in the number of stress hormones after massage is well documented in numerous studies facilitated by the Touch Institute and others (Field et al., 1992). Another study by The Touch Institute focused on PTSD experienced by children after hurricane Andrew. The children were given eight massage therapy sessions. The results showed they were happier and less anxious as measured by the Revised Children's Manifest Anxiety Scale (RCMAS) and STAIC. They also had lower salivary cortisol levels following therapy.

For this case study, the research reviewed includes studies on depression (including sexual abuse and eating disorder studies), pain syndrome studies, research on auto-immune conditions (including asthmas and chronic fatigue), immune studies (including HIV and breast cancer), and studies on aging and pregnancy and the reduction of stress on the job. Studies in which the activating neurotransmitters were measured in urine, with an average increase of 28%

serotonin and an average increase of 31% for dopamine, suggest that the stress-alleviating effects (decreased cortisol) and the activating effects (increased serotonin and dopamine) of massage therapy would be useful on a variety of medical conditions and stress related conditions (Field, Hernandez-Reif, Diego, Schansberg, Kuhn 2005).

Moderate Pressure Rationale: Only moderate pressure Swedish massage was used for this case study. Previous investigations (Diego, Field, 2009) have shown that in cases of stress and depression, the use of moderate pressure massage is significantly more beneficial than the use of low pressure massage. Measurements using electrocardiograms have demonstrated that using moderate pressure helps the body shift from sympathetic to parasympathetic activity. The same study showed that the use of low pressure massage yielded only a sympathetic nervous system response. During the Case Study, pressure was monitored by giving an explanation of the Pressure/Touch Scale before each chair massage. The Volunteer Intern Therapists asked throughout the massage what level of intensity the massage participant was experiencing. On a Pressure Touch Scale of zero to five, five meant “Stop for any reason. Too painful or just don’t want that area being massaged.” (See Appendix 23)

Secondary Goal: The secondary goal was to incorporate healthy touch through Swedish massage therapy and allow them to establish personal boundaries within areas of comfort/safety.

Secondary Goal Rationale: In general, incarcerated teens are deprived of touch as it is controversial and inappropriate for the staff to touch them. Although the facility does have supervised group visitation, not all of the teens have family or have anyone that will or is able to visit. According to the study “Time Out II: A Profile of BC Youth in Custody” by the McCreary Center Society, 47% of their parents never visited them while in custody (McCreary Centre Society, 2005).

The McCreary study also reports that “almost two-thirds of youth (64%) reported being physically abused” and “58% of the girls in custody had been sexually abused.” With the prevalence of physical and sexual abuse within this population, it was an important aspect of the case study to encourage the participant to establish their own personal physical boundaries with the Pressure/Touch Scale parameters. Body awareness was implemented through postural exercises with homecare stretch and strengthening exercises.

Also, informed consent was explicitly asked each and every time during the pre- massage interview of the Intake Form. (See Appendix 18)

Treatment Protocol: Volunteer Intern Therapists would insure Consent Forms were completed (See Appendix 21) prior to Intake Form interview. Once the pre-massage portion of the Intake Form was completed, two groups of three massage participants received a 30-minute Swedish massage in a massage chair, over their clothing, by the Volunteer Intern Therapists. With a timer, the Volunteer Supervising RMT would read out the Massage Routine and the massages were performed at the same time.

Volunteer Intern Therapists were all dressed professionally in clinic attire, each providing their own portable massage chair and blood pressure kits. The pre-massage STAI for Adults forms were handed out to the Aspira unit girls who wished to participate; all agreed enthusiastically to take part except for one. In regards to the girl that chose not to participate, it was remarked by the others that “no one ever touches her.”

Once the STAI tests were completed, the massage participants were randomly paired with a Volunteer Intern Therapist on a first-come-first-serve basis. This kept the Volunteer Intern Therapist and massage participants varied in order to avoid favouritism. The Volunteer Intern Therapist would then complete the pre-massage portion of the Intake Form. This included stress

and anxiety related questions, homecare follow up and baseline measurements of visual analogue scale, blood pressure and heart rate. See Appendix 18 for sample Intake Form & VAS.

Massage Routine: (See Appendix 23 for detailed description.)

- Pain Scale read aloud
- Diaphragmatic Breathing-30 seconds
- Back-5.5 minutes
- Upper Trapezius-3 minutes
- Right Arm-3.5 minutes
- Right Hand-2.5 minutes
- Left Arm-3.5 minutes
- Left Hand-2.5 minutes
- Neck-3 minutes
- Neck- 2 minutes
- Back-3.5 minutes

Hydrotherapy was not included in the case study in order to limit the number of variables. Most traditional hydrotherapy modalities would be difficult or impossible to implement in a corrections facility.

OUTCOME.....

State Trait Anxiety Test: The Primary Subject's average pre-massage State test score was 52 and her average post-massage State test score was 22, a reduction of 58%. The Primary Subject's average pre-massage Trait test score was 57 and her average post-massage Trait test score was 57 showing no change. Given that the fourth and fifth treatments were performed in sequence on Aug 2, (for a combined total of a 60 minute massage), it skewed the results showing a decrease of 12% for that session. (See Figure 1)

Primary Case Study Subject State Trait Anxiety Test Results -5 Treatments

Date	State Pre-tx	Trait Pre-tx	State Post-tx	Trait Post-tx
1- July-14-09	52	53	25	56
2 -July-21-09	50	53	22	55
3- July-28-09	54	60	23	60
4- August-02-09	51	59	21	60
5- August-02-09	51	59	21	52
Mean	52	57	22	57

Figure 1

For a more accurate picture of the results, the fifth treatment was removed in Figure 2 showing an average of the Trait pre test to 56 and the Trait post test 58 for all of the 30-minute treatments, for an increase of 3%.

Primary Case Study Subject State Trait Anxiety Test Results -4 Treatments

	State Pre-tx	Trait Pre-tx	State Post-tx	Trait Post-tx
1-July-14-09	52	53	25	56
2-July-21-09	50	53	22	55
3-July-28-09	54	60	23	60
4-August-02-09	51	59	21	60
Mean	52	56	23	58

Figure 2

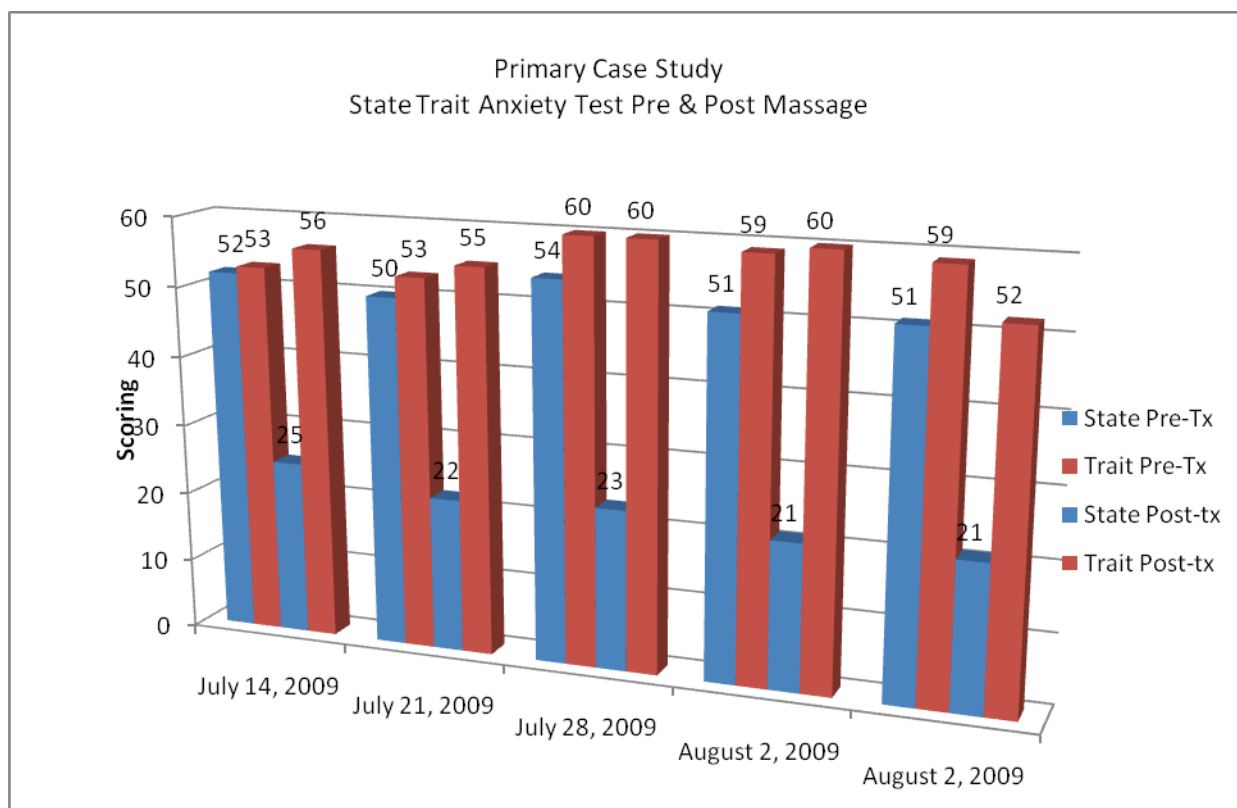


Figure 3

According to the STAI for Adults scoring information these results are considered high in all categories. The high school normative sample consisted of 424 tenth-grade students (222 were female) tested during regular class periods.

The norms for military recruits are based on two samples: 1,701 male Air Force recruits tested on the second or third day of basic training at Lackland Air Force Base, Texas and 263 Navy recruits (192 males; 71 females) tested on their fifth day of basic training at the Navy Recruit Training Command, Orlando, Florida. (Spielberger, 1983)

With a raw average score of 52 for her pre-treatment State test, this puts her in the 84th percentile rank for average high school girls. With a raw average score of 57 for her pre-treatment Trait test, it puts her in the 93rd percentile group for average high school girls her age.

For comparison, her scores are higher than the Adult Male Inmates and closer in relation to the highest category, Male Neuropsychiatric (NP) Patients, General Medical and Surgical (GMS) Patients, and adult male Prison Inmates. (See Appendix 20 for complete STAI tests.)

In the NP category, the Primary Subject's State score was 4.26 higher and her Trait score was higher by a difference of 10.08. In this group she was in the 63 percentile for the State test and 79th percentile group for the Trait

In the adult male prison category, her State test mean of 52 puts her in the 71st percentile, while her mean Trait score of 57 puts her in the 89th percentile. (See Figure 4)

STAI Scoring Comparisons

Primary Subject	State Mean		Trait Mean	
	52		57	
Means & Standard Deviations	State Mean	State S.D	Trait Mean	Trait S.D
Female High School Students	40.54	12.86	40.97	10.63
Military Recruits	47.01	14.42	40.03	9.9
Percentile Ranks	State		Trait	
Female High School Students	84%		93%	
*Male Military Recruits	77%		97%	

***no female percentile stats**

Means & Standard Deviations	State Mean	State S.D	Trait Mean	Trait S.D
Total NP Patients	47.74	13.24	46.62	12.41
Total GMS Patients	42.38	13.79	41.91	12.7
Adult Male Prison Inmates (mean age was 21)	45.96	11.04	44.64	10.47
Percentile Ranks	State		Trait	
NP Patients	63%		79%	
GMS Patients	80%		92%	
Adult Male Inmates	71%		89%	

Figure 4

According to the STAI for Adults scoring information these results are considered high in all categories. With a raw average score of 52 for her pre-treatment State test, this puts her in the 84th percentile rank for average high school girls. With a raw average score of 57 for her pre-treatment Trait test, it puts her in the 93rd percentile group for average high school girls her age.

Results: The 58 % reduction in her Post message State mean score from 52 to 22 moves her from the 84th percentile rank to the bottom 4% percentile group for female high school students her age. The Post message Trait mean score increase of two points to 58 brings her into the top 94% group for female high school students her age.

VAS: Primary Subject's pre-treatment average was 4 out of a possible 10 and her post-treatment score average was 0.04 for a total average decrease of 3.6. Her VAS score went down to 0 each time except July 28 which her pre-treatment score was 8 out of 10 and post-treatment was 2 out of 10. This is still a consistent decrease with the others by either a maximal decrease or by at least 6 points.

Primary Subject's Heart Rate: Her heart rate average pre-massage was 58 per minute and post-massage was 65 beats per minute. An average increase was unexpected based on the research collected for this case study that “moderate pressure massage elicits a parasympathetic nervous response” (Diego 2009) which should decrease her heart rate.

Her highest increase reading of the five treatments was the last one which she received a 60 minute massage in total. Her pre-treatment heart rate was 60 beats per minute and post-treatment heart rate was 84. (See Figure 5 and 6)

Primary Subject's Blood Pressure: The Primary Subject's average pre-diastolic blood pressure was 82 and average pre -systolic 88. Her post-diastolic blood pressure was 67 and post-systolic was 70, showing a diastolic blood pressure decrease of 18.3 % and systolic blood pressure decrease of 20.5 %. (See Figure 5 and 6)

Date	Vital Sign	Pre-Tx	Post-Tx
July 14 2009	HR/min	48	60
	BP-Sys	92	68
	BP-Dia	82	65
July 21 2009	HR/min	60	60
	BP-Sys	72	60
	BP-Dia	72	62
July 28 2009	HR/min	60	60
	BP-Sys	98	68
	BP-Dia	84	62
Aug 2 2009	HR/min	64	60
	BP-Sys	89	87
	BP-Dia	68	68
Aug 2 2009	HR/min	60	84
	BP-Sys	87	68
	BP-Dia	102	76

Mean	
HR- Pre	58
HR-Post	65
Dia-Pre	82
Dia-Post	67
Sys-Pre	88
Sys-Post	70

Figure 5

Primary Subject's Vital Statistics

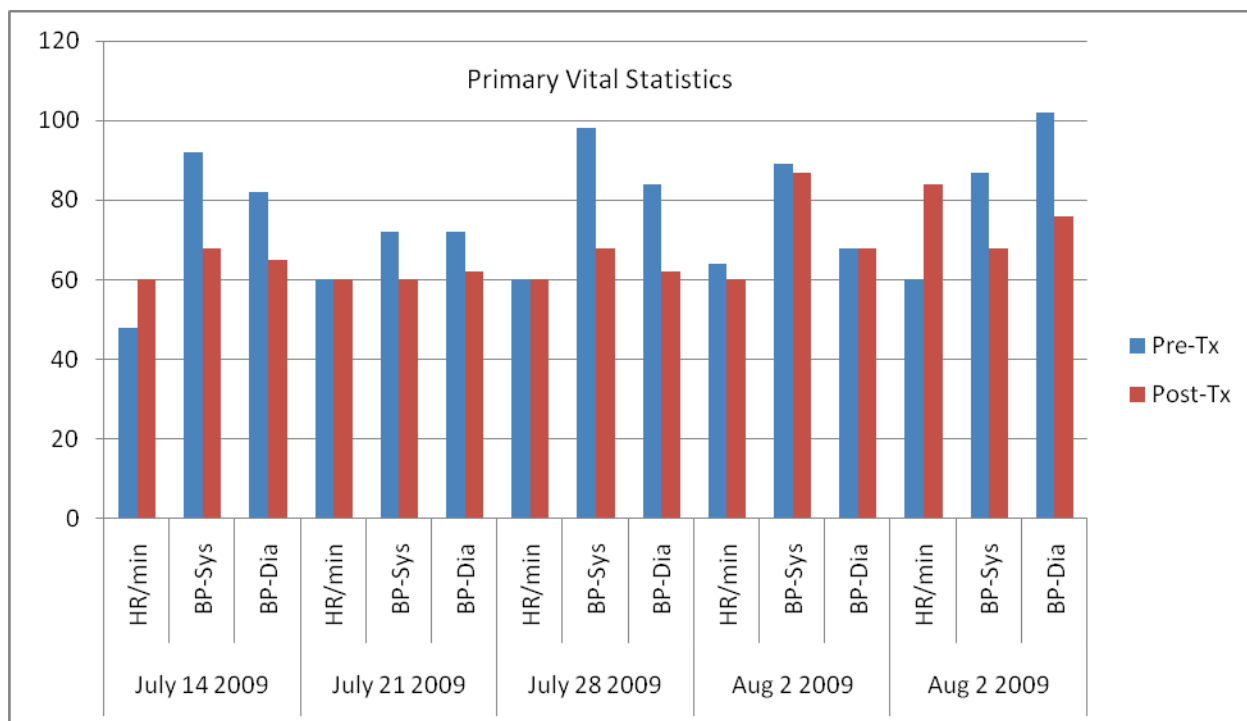


Figure 6

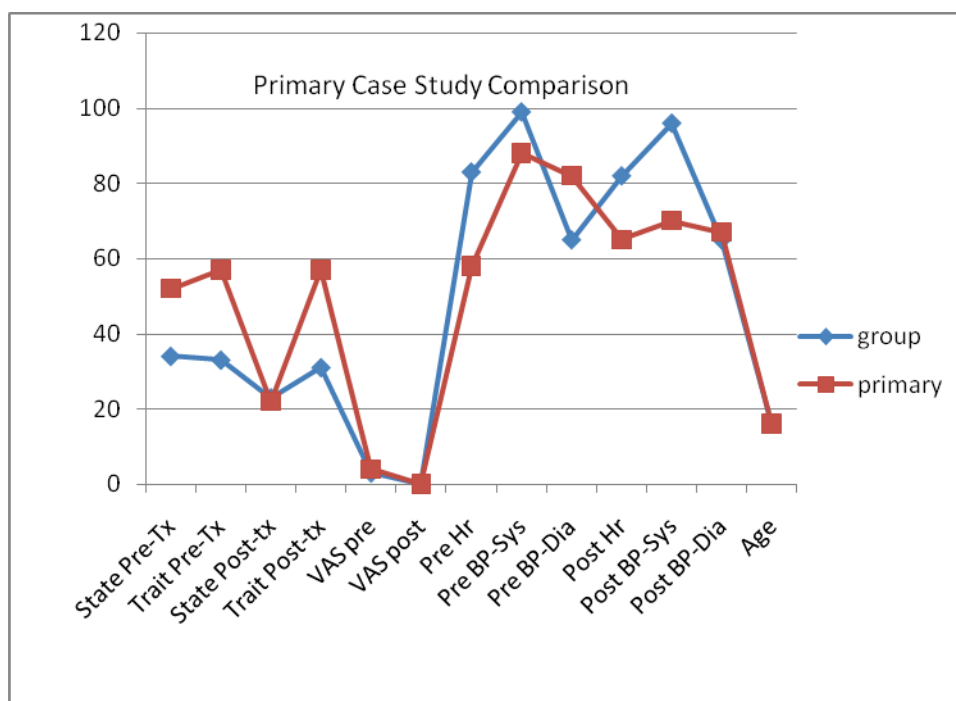


Figure 7

Figure 7 is comparing the Primary Subject's results with that of the massage participant groups' results of 21 individual treatments to show similar results in a larger pool of subjects with the same criteria of a median age of 17. See chart in Appendix 23 for complete results.

Treatment Outcome Table: The outcomes were largely subjective. For details of the individual treatments, refer to Appendix 23.

The summary is as follows: Falling asleep/staying asleep, angry/aggressive episodes and stress levels were asked on the intake form each time with "Better", "No Change" or "Worse" being the possible answers. The Primary Case Study responded to "No Change" or "Worse" to all every time except Aug 2, (the last week) which she responded "Better" to angry/aggressive episodes.

July 21 during the Intake Form-Pre VAS & Vitals, the Primary Subject reported that she had been using the Diaphragmatic Breathing technique when anxious and said that "it has helped". One of the other massage participants nearby said that she too had used Diaphragmatic Breathing to calm herself when angry.

Treatment Modifications: Intake Form changed slightly having the VAS scale separate from the questionnaire keeping Intern Therapist notes private. Also a line was added to record the VAS score pre- and post-treatment. The second week post-treatment blood pressure and pulse were taken immediately after the massage before they moved from the chair.

Compliance:

- The Primary Subjects' homecare of pectoral stretches and rhomboid strengthening were only done two out of the five weeks for a total of seven times.
- The Intake Form prompted the Intern Therapists to ask the massage participants to bring their journals to their massages. The Primary subject never brought hers and of the group, only one girl brought her journal on one occasion.
- The Unit Supervisor checklist was never done.

Feedback: BYSC Volunteer Coordinator;

- The massages seem to calm each individual girl which made the entire unit have a different atmosphere. It became quieter, calmer, and individuals seemed to be more respectful of noise levels and personal space.
- Staff demeanour also seemed to change during and after the massages.
- The girls' concentration regarding school work appeared to be better following the massages.
- The girls reported sleeping better and feeling more rested in the morning for school.
- The girls recorded more time exercising during the weeks that they received the massages
- The girls reported that they didn't feel like they were in prison, which made them feel ``normal``.

Variables: The Primary Intern Therapist had an established relationship with massage participants 1, 2, 4, and 6 from the Pilot Test. As it got close to the end of the Case Study those that had participated in the Pilot Test did request massages from the Primary Intern Therapist.

- 1st week - several disrupting loudspeaker announcements and an angry outburst by one of the massage participant. It was very hot in the treatment room.
- 2nd week - fans were used which may have helped drown out some background noise.
- 3rd week - the fifteen minute massage routine was used for the first part of the massage changing the sequence slightly.
 - popsicles were distributed by a staff member to participants
- 4th week, massage participant 4 had a visitor arrive so left before her massage was over. She completed the Post State Trait Anxiety Test but unfortunately didn't have time for Post Vital Signs or VAS.
- 5th week massage participant 4 reported not sleeping well because of tight braids in her hair. Primary Subject was "in seclusion" and unavailable for her last massage treatment.

DISCUSSION.....

Primary Subject's Heart Rate and Blood Pressure: Her average heart rate pre massage was 58 beats per-minute and post-massage was 65 beats per-minute. The largest difference in one treatment records an increase of 24 beats per-minute. Her pre-treatment heart rate was 60 beats per-minute and post-treatment heart rate was 84. These results are unexpected, considering the highest blood pressure reading was after two sequential treatments on Aug 2, 2009.

If the last blood pressure from Aug 2, 2009 is omitted and the average is based on four treatments, her heart rate would still show a mild increase of 46 pre-treatment and 48 post-treatments on average.

Both blood pressure and heart rate could have been executed better during the case study. For example: each Volunteer Intern Therapists having their own stop watch, newly calibrated blood pressure cuffs, and all Volunteer Intern Therapists using the same make and model for both. It is possible that the Volunteer Intern Therapist could have been mistaken in the blood pressure results, or if it was taken in a 15 second sample it would have a greater margin of error.

These results could also be related to the high norepinephrine/cortisol ratio that is reported with most people with PTSD. Further investigation would be required including biochemical testing to better understand and verify these results.

STAI: It was anticipated that the post-treatment State test would lower and that the post-treatment Trait test would either lower or stay the same. This was not the case for the Primary Subject. While results of her State test portion decreased by 58%, her Trait analysis results stayed the same or increased by an average of 3%, except for one occurrence. In this case, she had received two 30-minute massages consecutively, resulting in a decrease of 12% on her post

Trait test result. These findings suggest that those with PTSD could benefit from longer treatment sessions.

Juvenile Justice System: A number of items were noted during the research and conduction of this case study.

- There is a limited amount of research available on Canadian incarcerated youth; most of the research and statistics included in this case study are from U.S. studies.
- It became evident in the course of research that PTSD is prevalent among the female incarcerated juvenile population but often goes undiagnosed and/or unrecognized. This is true for the U.S. studies cited in this case as well as the BYCS case study participants.
- It was anticipated that a corrections centre would provide a strictly-controlled environment in which to conduct a case study; this was not the case based on the number of variables that could not have been anticipated at the outset. Perhaps future studies could refine parameters to reduce the potential for variables inherent in a corrections/detention setting.

CONCLUSION.....

This case study concludes that using moderate pressure Swedish massage techniques may offer an effective complementary modality to decrease anxiety relating to PTSD among girls in the juvenile justice system. The subjective outcomes of the case study went beyond expectations regarding the level of the study's acceptance at BYSC, the level of participation, and the achievement of both the primary and secondary goals. By the second week of treatment the patients were beginning to exhibit positive changes in behaviour. Two of the massage participants had started to utilize the diaphragmatic breathing techniques and were using them to deal with stress, anxiety and anger. By week three the participants were beginning to show signs of trust towards the Volunteer Intern Therapists by reciprocating 'healthy' touch. Some of the girls began to share their feelings and personal information with the Volunteer Intern Therapists. In order to validate the more subjective findings in this case study it would be beneficial to enlist biomedical testing to quantify biochemical changes and correlate them to emotional and behavioural changes.

The conditions that girls are faced with in the juvenile detention system have been shown to exacerbate trauma rather than diminish it. The characteristics of detention, including seclusion, staff insensitivity, loss of privacy, and traditional methods of preserving order and asserting authority, can worsen feelings of negativity and loss of control, resulting in re-traumatisation, re-victimization, self mutilation and suicide attempts (Cauffman, et al., 1998).

Incorporating clothed moderate pressure Swedish chair massage into the existing Life Skills Programs of the juvenile justice system would be simple and effective and the benefits would be immediate.

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