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Craniosacral Therapy: The Science of Belief

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CRITICALLY APPRAISED TOPIC

TITLE

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Craniosacral Therapy Overview

Introduction: Craniosacral therapy is an evaluation and treatment approach used by a growing number of clinicians (Wirth-Patullo & Hayes, 1994). "The approach assumes the presence of craniosacral motion which is referred to as craniosacral rhythm" (Wirth-Patullo & Hayes, 1994, p. 908). Craniosacral motion is reported to be stable during times of exercise and rest but can be disrupted due to trauma, autism or other mental and physical conditions (Wirth-Pattullo & Hayes, 1994). Founders of craniosacral therapy report that craniosacral therapy produces clinical improvement in patients with pain and dysfunction (Wirth-Patullo & Hayes, 1994). However, there is controversy based on the use of palpatory findings and the weak theoretical and research support (Wirth-Patullo & Hayes, 1994). Many believe therapists are really feeling heart rates and/or respiratory rates (Wirth-Patullo & Hayes, 1994). There is limited research available regarding craniosacral therapy but there are many physical therapists, occupational therapists and other health professionals continuing to use this approach in practice, which increases the need for further examination and research on this topic (Wirth-Patullo & Hayes, 1994). In the following critically appraised topic, the background information on craniosacral therapy will be discussed along with the current research.

Epistemological foundation: "There is an ongoing rhythmical motion of the underlying dural membrane caused by the production and reabsorption of CSF, which is transmitted to the bones." The dural membranes are supposedly responsible for moving the cranial bones. The reciprocal tension membrane system (RTM) creates a system of inhalation and exhalation from the cranium. Cerebrospinal fluid is believed to interact with every fluid in the body, and is believed to oscillate, ebbing and flowing in tidal movements that are affected by the moon (Giaquinto-Wahl, 2009).

Methodology: "Craniosacral therapy practitioners release fascial adhesions through diaphragm release techniques and release membrane restrictions by mobilizing separate bones of the cranium." The rhythm of the cerebrospinal fluid is analyzed. Then a stillpoint is created, and the lumbar and sacral regions are lengthened. The therapist listens for the movement of the rhythm with their hands and adjusts the flow accordingly. Therapists direct healing energy to set the intention of the healing to take place (Giaquinto-Wahl, 2009).

Contraindications: Aneurism, CVA, Intracranial Hemorrhage

History: William Sutherland, an osteopath, discovered the technique by experimenting with screwing metal plates into his own head, Examining a disarticulated skull, he believed cranial sutures in the parietal bones were like fish gills through which the skull breathed (Giaquinto-Wahl, 2009). Dr. John Upledger modified Sutherland's work and coined his training to new practitioners as craniosacral therapy (CST). Dr. Upledger also coined most of the associated terminology in use today. He pioneered the concept of stillpoints and rhythmic flow within the craniosacral system. Both Upledger and Sutherland trained as Osteopathic Physicians at A.T. Stills University, with Upledger building on and modifying Sutherland's ideas.

Education requirements for certification: Multiple seminars totaling $10,748 including the following classes: The Brain Speaks, Somatoemotional Release, and Craniosacral Dissection. Typically, physical therapists, occupational therapists and massage therapists receive training as craniosacral therapists. Pre-requisites include having "a license to touch."

Conditions treated with craniosacral therapy as noted by the Upledger Clinic.

ADHD	Bronchitis	Fluid retention	Menstrual Pain	Sciatica
Allergies	Cerebral palsy	Headaches	Migraines	Scoliosis
Alzheimer's	Chronic fatigue	Hemorrhoids	Morning sickness	Sinusitis
Arthritis	Colic Constipation	High blood pressure	Muscular Dystrophy	Sleep disorders
Asthma	Dental trauma	Hormonal issues	Muscular pain	Sprains/strains
Autism	Depression	Hyperactivity	(ME) Myalgic encephalomyelitis	Stress
Back pain	Digestive problems	Infertility	Nervous disorders	Stroke
Birth trauma	Emotional issues	Insomnia	Neuralgia	TBI
Bladder conditions	Epilepsy	Irregular head shape	Neurovascular disorders	Tinnitus
Bone disorders	Exhaustion	Jaw problems	Postnatal depression	TMJ
Breastfeeding difficulties	Fibroids	Joint disorders	Premature birth	Vaccination side effects
Breathing disorders	Fibromyalgia	Low immunity	PTSD	Visual problems

Focused Clinical Question

In adults and children with physical and/or mental conditions, does craniosacral therapy, compared to no craniosacral therapy, reduce frequency and intensity of symptoms related to their condition?

Search Strategy

Terms used to guide the search strategy
• **P**atient/Client Group: Recipients of craniosacral therapy including individuals with chronic pain, migraines, fibromyalgia, cerebral palsy, autism and ADHD. • **I**ntervention (or Assessment): Craniosacral Therapy • **C**omparison: Individuals not receiving craniosacral therapy • **O**utcome(s): Is it beneficial to clients with various mental and physical health conditions

Databases and Sites Searched

Databases and Sites Searched	Search Terms	Limits Used
Medline **Cinahl** **PsycINFO** **Google** **Multifile** **OVID**	**Craniosacral Therapy** **Cranial Sacral Therapy** **Effectiveness** **Systematic Review** **Cerebrospinal fluid** **Cranial manipulation**	**None**

Inclusion and Exclusion Criteria

Inclusion criteria included articles written in English, within the last 50 years and research performed on living mammals. No exclusion criteria was developed due to the limited research available on craniosacral therapy.

Summary of Key Findings

Level of Evidence	Study Design	Number of Articles
I	Systematic reviews, meta-analyses, randomized controlled trials	6
II	Two groups, nonrandomized studies (e.g., cohort, case-control)	6
III	One group, nonrandomized (e.g., before and after, pretest and posttest)	0
IV	Descriptive studies that include analysis of outcomes (single-subject design, case series)	1
V	Case reports and expert opinion that include narrative literature reviews, consensus statements and websites	2

Summary of Levels: I

There is more opportunity for evidence to examine the field of CST and learn more about the claims made by craniosacral practitioners. Many flawed research articles can be misleading to the public making CST seem credible. The two systematic reviews examined found a majority of low levels of evidence with each study having inadequate research protocols rather than using an appropriate design that would be generalizable to the public. Even in 2006, fewer than 50 relevant references for CST were available for a systematic review (Isbell,Neira, & Elliot, 2006). Green, Martin, Bassett, and Kazanjian (1999) found insufficient evidence to link CST and health outcomes with pathophysiological conditions.

Mataran-Penarrocha, Castro-Sanchez, Garcia, Moreno-Lorenzo, Carreno, and Zafra (2011) noted the improvement in physical function achieved with CST was similar to that with aerobic exercise modalities. One flaw in a research design in another level I study included using outcome measurements designed to assess mental illnesses and the effects of drug treatments and palpating stillpoints of the cerebrospinal fluid from head to feet (Castro-Sanchez, Mataran-Penarrocha, Quesada-Rubio, & Granero-Molina, 2011). Another outcome measure style used included questionnaires with Likert scales that do not actually measure the biological effects of CST, but the participant's rating on subjective improvement (Mataran-Penarrocha et al., 2011). Curtis et al. (2011) reported the alternative therapy control used to study the effectiveness of CST do not often have enough research on them. This study used a modified outcome measure that had not been validated for the purpose of testing the effectiveness of CST, but did find patient's expectations of an intervention correlated positively to their treatment outcomes (Curtis et al., 2011). These researchers also noted that in order for the benefits of CST to be maintained, an individual must continually receive CST. Overall the randomized control trial studies provided limited information on the biological effects of CST treatment, instead they emphasized the participant's subjective report of improvement.

Summary of Levels: II

There was frequent misrepresentations with the data in some studies. Cutler, Holland, Stupski, Gamber, and Smith (2005) failed to report that the sham treatment group stayed asleep longest, and instead focused on the CST group falling asleep fastest by a few minutes. Cutler et al. (2005) also relied on perceived stillpoints with the pulsations of cerebrospinal fluid which has no inter-rater reliability to confirm these occur and used outcome measurements to show nerve conductions, muscle fibers, and retinal movement, but could not use any instrument to show pulsations of the cerebral spinal fluid. Wirth-Pattullo and Hayes (1994) reported practitioners in training learn the proposed ranges of rates for heart rate, pulse rate, and cerebrospinal fluid pulsations and may be predisposed to report numbers they perceive to be approximately correct and in fact the cerebrospinal fluid pulsations are actually from the heart. Isbell and Carroll (2006), stated that patients felt like something improved but nothing indicated it was the result of CST. Isbell and Carroll also used a Likert scale that allowed the patients to see how they rated themselves on all previous visits and blamed poor results on students watching CST being performed. Raviv, Shefi, and Achrion (2009), had limited follow-up through a questionnaire with the patients but still concluded CST was effective for treating lower urinary tract symptoms. Upledger (1977) focused more on the possible errors in his study due to the examiner's methods versus questioning the reliability of CST or rhythmical impulses.

Downey, Barbano, Kapura-Wadhwa, Sciote, Siegel, and Mooney (2006) performed a study on rabbits and demonstrated a therapist would have to increase the clinical force by 100-200 times the amount of force used currently to distract the cranial bones. Upledger, a leader of CST, stated rabbits have a craniosacral system similar

to humans, and rabbit sutures are more pliable than humans making them an ideal sample to study bones being moved.

Summary of Levels: IV

Harrison and Page (2011) conducted a descriptive study where the results were not reported in terms of statistical significance. The purpose of the study was to help describe CST to other colleagues who had limited interest in complementary medicine. The only conclusion made by the Harrison and Page (2011) was that systematic recording of clinical data in CST is feasible and capable of informing future research. The authors did not attempt to suggest further research that needs to be conducted, limitations of their study or how their methods might be improved.

Summary of Levels: V

Gillespie (2009) performed a case study on a child with Attention Deficit Hyperactivity Disorder. After the participant received craniosacral therapy his behavior improved by parent and teacher report. The author reported after seeing hundreds of children for over 30 years with locked brain cycles that this therapy can be a critical factor in the healing of their central nervous system. The author does not support these statements with prior research. In the conclusion it is also noted basic research is urgently needed on craniosacral therapy.

The Upledger Institute International Incorporated (2011) is the primary website for craniosacral therapy. The website claims craniosacral therapy's effectiveness for a variety of dysfunctions and diseases. Many of the articles and references are only available with purchase. The website is laden with testimonials with limited research-based articles or scientific evidence for craniosacral therapy effectiveness.

The vast majority of studies reviewed whose purpose was to support or further examine the use of CST used:

- Methods that were inappropriate for their study question
- Outcome measures that were inappropriate for the study question (Mataran-Penarrocha et al., 2011)
- Outcome measures that were not valid or reliable (Curtis et al., 2011; Isbell & Carroll, 2006)
- Statistical analysis that was not meaningful (Harrison & Page, 2011)
- Based on subjective use of Likert scale questionnaires (Mataran-Penarrocha et al., 2011; Isbell & Carroll, 2006)
- Sample population bias (Curtis et al., 2011; Cutler et al., 2005)
- Discussions incomplete or irrelevant (Cutler et al., 2005; Raviv, Shefi & Achrion, 2009; Upledger, 1977)

Implications

Implications for Consumers

The evidence reviewed above reveals little support for the use of CST in the numerous conditions it proposes to treat.

- Matatan-Penarrocha et al. (2011) noted that improved physical function achieved by CST protocols was similar to that obtained by aerobic exercise modalities and education programs. Consider whether these less expensive and more accessible options are better suited to consumer needs.
- Testimonials provided by practitioners and CST institutes are not evidence-based research and should not be taken as proof of efficacy.
- Comparative benefits of CST to basic massage therapy are unknown
- Smart consumption is key in order to prevent individuals from being taken advantage of and paying for a service that is not effective.

Implications for Practitioners

The evidence reviewed does not support the use of CST in therapy for the numerous conditions it proposes to aid. Practitioners should consider:

- The cost of training in relation to clinical effectiveness and biological plausibility
- CST appears to have evidence to support it, however critical review shows that the quality of the systematic reviews and randomized control trials is low
- Ethical responsibility to clients to ensure that treatments are not only not harmful, but beneficial and best practice
- Consider recommending treatments that are evidence-based and more cost-effective for clients

- Critically examine any treatment that claims to be effective for many non-related conditions

Implications for Researchers

Proponents of CST should consider these improvements to research methods:

- Limit the biases of sampling and intervention methods
- Use validated outcome measurements
- Use double blind studies for the clients and for the person rating outcomes
- Use practitioners who do not overly bias the test results by swaying the clients to believe one is more effective (Curtis et al., 2011)
- If it is a level 1 study it should look like a level 1 study (systematic reviews should be more than 3 pages)
- Drop claims of CST having a legitimate biological foundation
- Consider focusing research on differentiation between CST and standard massage therapy or other alternative medicines
- Controls for studies should have research to show effectiveness (i.e. magnet therapy)

Critics of CST should consider:

- Further study role of interference of patterns or harmonic frequencies by continuous measurement of HR and RR in participants
- No interrater reliability in recognizing 'pulse-like flow patterns' in CST
- Upledger Institute does not think that research on the effectiveness of CST should be conducted because of 'variability' in human subjects
- Focus on similarity of effectiveness between CST and standard massage therapy

Clinical Bottom Line and Recommendations for Best Practice

This review is not proposing that craniosacral therapy is ineffective. Instead, it questions the proposed biological mechanisms of effectiveness of craniosacral therapy. Various research and studies have shown that the mechanisms claimed by craniosacral therapy specialists and the founder are not valid. These mechanisms may have benefits (i.e. psychological effects due to massage) but are not supported by evidence and research. The majority of research is subjective with poor design and control, or testimonials from practitioners and clients. As previously mentioned, this review is not trying to discredit craniosacral therapy as a whole, however, more research is needed and other mechanisms of effectiveness need to be explored. This research could be carried out through a variety of avenues; each time a clinician is performing CST they should be gathering information for a single case research study or case study. This will help gather information and credible research.

Summary of Research Articles

Author (Year)	Research Methodology	Level of Evidence	Sample Characteristics; Sample Methods; Inclusion & Exclusion Criteria	Instrument or Intervention Used & Outcome Measure	Results	Study Limitations
Castro-Sánchez, A. M., Matarán-Peñarrocha, G. A., Quesada-Rubio, J. M., & Granero-Molina, J. (2011).	Randomized Control Trial	Level I	n= 92 Convenience sample from a local hospital. Inclusion: fibromyalgia, 16-65 years old. Exclusion: impaired skin integrity, practicing any type of physical activity, receiving other non-pharmacological therapies	Baseline data gathered regarding pain intensity and heart variability. Received intervention 2x/week for 20 weeks. The intervention group received a 1-hour session of CST and placebo received sham magnet treatment. Outcomes measured using tender point evaluation (pressure algometry), electrocardiogram recordings, QRS complexes and deviations from RR intervals, and the clinical global impression of severity (CGIS) and clincial global impression on improvement (CGII). CGI scales are used to assess mental illness and drug effects.	After 20 weeks of therapy, pressure algometry analyses showed significant reductions in the number of tender points in the intervention group vs. placebo. Measures of CGIS/CGII were found significant in the intervention group vs baseline using repeated-measures ANOVA. At 2 months post-therapy, CGIS did not differ significantly between groups, although did for the CGII. At 1-year post therapy, the intervention group showed significant differences vs baseline. No change in heart rate was observed.	Patients were recruited from a single hospital and the outcome measures were not validated for the purpose of this study.
Curtis, P., Gaylord, S. A., Park, J., Faurot, K. R., Coble, R., Suchindran, C., . . . Mann, J. D. (2011).	RCT	Level I	n=65 adults Not described on how recruited	CST and sham LSSM were given weekly for 5 weeks. Used a modified Borkovec and Nau they created for this study.	After one session subjects viewed LSSM as less logical than CST. Stronger confidence was placed in CST. Both group subjects were	Bias giving preference to CST over LSSM before separating sample into each group.

					strongly positive about the competence of the therapist with no between-group differences.	Therapist had no prior experience administering LSSM. Subjects were drawn to the study in hopes of getting CST. Modified outcome scale without validating it first.
Cutler, M. J., Holland, S., Stupski, B. A., Gamber, R. G., & Smith, M. L. (2005).	Before and After Randomized Block Design	Level II	n=20 adults Volunteer. Recruitment is not described. Exclusion: pregnant, smokers, history of cardiovascular, pulmonary, or neurologic disease. Not on medications. Groups were not the same size.	Compression of 4th ventricle (CV4), CV4 sham, and control (no treatment) EEG, EOG, EMG, Heart Rate, Blood Pressure, Microneurographic technique, Multiple Sleep Latency Test	Sleep latency was lowest for CV4; the group slept longest with CV4 sham. Researchers did not explicitly state the CV4 sham group slept longest, it was only found by performing outside calculations.	Study was supported by American Osteopathic Association which has been using cranial manipulation for approximately 100 years.
Downey, P.A., Barbano, T., Kapura-Wadhwa, R., Sciote, J.J., Siegel, M.I., & Mooney, M.P. (2006).	Quasi-Experimental	Level II	n=13 rabbits 100 other rabbits were excluded due to the catastrophic injuries incurred by the initial 13 test subjects.	The rabbits were anesthetized and plates were drilled into their skulls, a transducer inserted and the plates were slowly pulled apart. Measured movement of skull sutures and intracranial pressure with neuromonitors, radiographs, and electronic digital calipers.	No relationship was found between ICP and the amount of distractive force used. The forces required to distract cranial sutures were hundreds of times stronger than those used by therapists on human patients.	Lagomorph anatomy is only partially comparable to human anatomy. Due to similarities between lagomorphic and human cranial bone sutures, the

						results of the study clearly demonstrate that CST would need to be applied with far greater force than the vertebrae can withstand in order to obtain even minimal therapeutic benefit in humans.
Gillespie, B.R. (2009).	Case Study	Level IV	n=1 Participant was chosen based on ADHD diagnosis.	Intervention of CST not described in detail. Subjective report from teacher and mother regarding the participant's behavior.	The author/examiner concluded craniosacral therapy was beneficial to the child's behavior with decreased ADHD symptoms.	No measurements or standardized assessments were used to assess the participants' behavior only subjective reports. CST evaluator was also the author. This individual trains medical professionals how to perform CST.
Green, C., Martin, C.W., Bassett, K., & Kazanjian, A. (1999).	Systematic Review	Level I	n=33 studies were reviewed. In the table presented there were 7 in Dimension A, 5 in dimension B, and 3 in dimension C.	A. Craniosacral interventions and health outcomes B. Validity of craniosacral assessment C. Pathophysiology of the craniosacral system.	An older study which may not be relevant anymore. The review did not answer question on effectiveness of CST. It found practitioners do not often agree on CST	Several of the studies were case reports. The research articles were a low level of evidence and

					findings and recognizing the pulse-like flow patterns.	used inadequate research protocols.
Harrison, R. E., & Page, J.S. (2011).	Descriptive Outcome	Level IV	Convenience sample (n = 73) entered by 10 UCST practitioners, 1:4 male:female, average age 43 years, variety of problems including neck pain, back pain, fibromyalgia, headaches and unsettled babies.	Intervention not described in detail. Pre- and post follow-up with questionnaire. Glasgow Homeopathic Outcome Score was used but validity or reliability of measure was not discussed. There was no follow-up after a certain amount of time after intervention ceased. All subjects given Glasgow Homeopathic Outcome score (GHHOS) after UCST treatment. This was the only outcome score assessed. The scale was -1 to +4, -1 being deterioration and +4 being Cured on 1) their main problem, 2) any secondary problem affected by treatment and 3) any change in their general well-being. Average number of treatments was 4.5. Some qualitative statements also included in report.	Results were reported by measures of central tendency. The mean age was 43 years and the average number of treatments was 4.5. On the GHHOS, 74% of pts reported valuable or better improvement in their main problem, 67% reported valuable or better improvement in their secondary problem, and 75% of patients on meds reported decrease or stop of medication.	Informed consent and ethics were not discussed. The statistics were not described in clinically meaningful ways. The mean number of treatments is not a useful description to compare among the different conditions. GHHOS reliability and validity were not reported. Methods for gathering of GHHOS not reported.
Isbell, B., & Carroll, S. (2006).	Quasi-Experimental	Level II	n=46 patients from The University Westminster Clinic receiving craniosacral therapy. The patients were all being treated at the same clinic and were required to have	CST twice a week Measure Yourself Medical Outcome Profile (MYMOP) modified to remove visual analog scale.	Analysis of differences in scores between first and last: Presenting/first symptom= 57% of patients had improved scores; Overall well being= 35% had improved scores	Very small sample size. Informed consent was not discussed.

			attended at least two consultations		Analysis of averaged scores for each patient: high significance in the improvement of the patient's health scores ($p<0.001$ level $Z= -4.603$) There was a reduction of 4.6 on the scale as reported by patients from the first and last treatment.	Outcome measure was the focus rather than the intervention given. Measure was subjective and not supportive of CST effectiveness
Isbell, B., Neira, S.C., & Elliot, R. (2006).	Systematic Review	Level I	n=33 articles Populations that received CST and researched were: children with learning difficulties, cases of migraine, tinnitus, hemi-facial paralysis, stress release, and seizure disorders in children. Specifics about the samples in each piece of literature was not covered.	Interventions from each piece of literature was not described in detail. In each article, it was presumed that CST was the intervention being applied. There was no mention of how the articles were reviewed or if they were researched by multiple people and then compared for effectiveness.	33 articles were reviewed and 7 of them dealt specifically with the efficacy of craniosacral treatments. Case study research from various authors indicated that migraine, seizure disorders and stress could be treated in children. Overall, the reporting of results reflected a very general survey of the literature and few details were provided.	This review was limited in every aspect and is a starting point for synthesis of CST research. Though more samples of research articles could not be generated to make a larger study, a more in-depth review of each article would have been beneficial. Any limitations to using craniosacral therapy clinically is because of a lack of evidence addressing the

						effectiveness
Mann, J. Keturah, R., Wilkinson, L., Curtis, P., Coeytaux R., Suchindran, C., Gaylord, S. (2008).	RCT	Level I	n=109 Inclusion criteria: Subjects > 11 years of age, either gender, must meet ICHD criteria for migraine, headache frequency/month: 5–15, Headache history > 2 years, willing to complete daily diary, able to attend 8 weekly treatments	Outcome measurement was done prior to CST, after 8 weeks, 16 weeks and 20 weeks. The primary outcome variables assessed for this study include headache-related quality-of-life, number of headaches (frequency) and self-perceptions of the benefit of the intervention. Disability caused by headache and headache-related quality of life was tested with the headache impact test-6 (HIT-6). The HIT is a scaled, norm-referenced assessment that measures the functional impacts of headaches in areas of job, school, home and social situations. Pain, social functioning, role vitality, cognitive functioning, and psychological stress are covered in six scales. MIDAS is a seven-item questionnaire that measures level of disability by the number of days of school or work missed due to headaches. Headache diary (intensity, duration, satisfaction with care, medication use) Blood pressure and heart	The authors found that it is feasible to recruit for a migraine study in a randomized controlled trial using CST for migraines.	The study is prospective, and therefore no data will be generated until the RCT is actually performed.

				rate		
Matatán-Peñarrocha, G.A., Castro-Sánchez, A.M., García, G.C., Moreno-Lorenzo, C., Carreño, T.P., & Zafra, M.D.O. (2011).	RCT	Level I	n=84 Randomization was used. Inclusion Criteria: diagnosis of fibromyalgia, ages 16-65 and agreement to attend afternoon therapy sessions. Exclusion Criteria: Presences of physical or psychological disease, presence of infection, fever or hypotension, and/or presence of any skin disorder or respiratory alterations that could limit the application of the treatments.	Before any therapeutic protocol was applied to the sample, baseline data concerning anxiety, depression, sleep quality in the study participants was gathered. These same areas were re-tested at 30 minutes, 6 months, and 1 year after the last session of the 25-week treatment program. Interventions: CST and Fake Ultrasound Treatment Measurements: Visual Analogue Scale (VAS). It assessed the intensity and the degree of alleviation in pain experienced by the patient. Short form-36 health survey (SF-36). The SF-36 is a multi-purpose, short-form health survey with only 36 questions. It yields an 8-scale profile of functional health and well-being scores as well as psychometrically-based physical and mental health summary measures and a preference-based health utility index. Pittsburgh Sleep Quality Index (PSQI). Provided scores for subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep	After one year, the intervention group had significant improvement compared to baseline results in sleep duration (P>.040), habitual sleep efficiency (P<.044), and daily dysfunction (P<.039). No significant differences in anxiety, depression, pain, or quality of life were found between the two groups. No significant intra-group or inter-group differences were found in state anxiety, depression or pain.	Inability to study 25 of the 376 participants in the accessible population before the randomized selection of the study group, due to incompatibility with their work schedules. The disparity between the males and females diagnosed with fibromyalgia could be conditioned by the cultural setting. Surveys with Likert scales were used as a form of measurement which does not actually assess CST at all.

				duration, habitual sleep efficiency, sleep disturbance, use of hypnotic medication and daily dysfunction. Beck Depression Inventory (BDI). This measure was self-applied and consists of 21 items. Each item is scored on a range of 0-3 (from least to greatest severity). State Trait Anxiety Inventory (STAI) was used to assess anxiety. It is a 40-item questionnaire that measures trait and state anxiety.		
Raviv, G., Shefi, S., Achiron, A. (2009)	Cohort Study	Level II	n= 28 The study included 24 females and 4 males all with MS and bladder hyperreflexia.	The outcome was measured 4 times once per week for 50 minute cycles of CST. Expanded Disability Status Scale (EDSS) (pre-test Qol) Overactive Bladder Verified 8 (OAB-V8) 8 question likert scale pertaining to self-perception of urinary control. Urinary frequency and urgency (un-named 6 question Likert scale, post-test) Ultrasonography	22 patients reported improved quality of life (79%) and 6 patients (21%) reported no change. No side effects from the CST were noted.	The study relied heavily on quality of life questionnaires utilizing Likert scales. The scope and duration of the study was limited, with one post-treatment test and no further follow-up.
Wirth-Pattullo, V., & Hayes, K.W. (1994).	Quasi-Experimental	Level II	n=12 6 males, 6 females,Convenience sample, volunteer basis, subjects > 10 years, all had history of trauma (as defined by CST), no	Measured subjects' craniosacral rate at base of cranium. Measured subjects' RR pre-and post- craniosacral rate measurement, and HR pre-craniosacral rate	ANOVA of 3 examiners measurements of craniosacral rate among subjects, ICC = -.02. Reliability of nurses' measurements for HR =	Small sample size. The subjects recruited on "volunteer" basis and

			subjects receiving PT	measurement. Measured RR and HR of examiner pre-craniosacral rate measurement. 3 examiners measured craniosacral rate systematically of each of the subjects.	.66, 1st RR = .82, and 2nd RR = .76. Pearson Correlation Coefficient were used to calculate correlation among craniosacral rate and all other rates (HR and RR). Correlations were not significant.	connection with researchers not described. The amount of time to measure craniosacral rate after palpation was low (1 minute). The examiners used different vault holds. The reliability among nurses measurements of HR was not good (.66)
Upledger Institute International Inc. (2011)	Website (N/A)	Level V	N/A	CST Interview	CST is effective in treating a number of conditions and is used throughout the world. There is a certification program and many classes that one can take.	Lack of empirical evidence to support CST as an effective intervention. Many false claims regarding conditions and the craniosacral system. Majority of supporting resources for CST are testimonials. Website is promotional rather than scientific.

Upledger, J.E. (1977).	Single Case Design	Level IV	n=25 Sample included children between the ages of 3 and 5 years of age from one daycare facility. Unknown female to male ratios. Inclusion/exclusion criteria was not discussed.	Assessment of craniosacral rhythmical impulses was measured by two examiners one after another with a Likert scale form of measure. Pulse and Respiratory Rate of the examiner and the participant. Nineteen parameters of craniomotion were rated on a three-point scale: 1= easy or “normal” response to induced passive motion; 2= moderate or transient restriction to induced passive motion; and 3= severe or complete restriction to induced passive motion.	Reliability coefficients are below the acceptable levels (0.7) on parameters 3 and 10 in the cranial portion of the examination. This low reliability coupled with high percent of agreement is probably due to the scarcity of abnormal findings. Overall percentage of agreement for the examiners was 86 percent.	The author of the article is John E. Upledger, who is the founder of craniosacral therapy and could indicate a bias in the results. The author seemed to emphasize on the possible errors some of the researchers/examiners could have made instead of questioning reliability of the measure or the concept of cranial rhythmic impulses.

Important note on the limitation of this CAT

This critically appraised paper (or topic) has been peer-reviewed by one other independent person/lecturer, writers are students and do not presume to be experts in this field, this work is offered as a mechanism to facilitate discussion among practitioners regarding this treatment approach.

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