Effects of Edublox training versus Edublox training combined with cervical spinal manipulative therapy on visual memory

A research proposal presented to the Faculty of Health Sciences, University of Johannesburg, as partial fulfilment for the Masters Degree in Technology: Chiropractic by;

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1. EXECUTIVE SUMMARY

Brain hibernation or cerebral dysfunction theory is the diminishing of brain function due to poor blood flow as a result of compression of the vertebral, basilar, internal carotid and subclavian arteries (Buchanan, 2004). Compression is usually due to skeletal malalignment, ligamentous or muscular in origin and correction of this by cervical spine manipulation suggests that the above difficulties may be improved (Buchanan, 2005). Thomas and Wood (1992), suggest that there is a correlation between upper cervical adjustments and improved mental function. This has been shown by Shambaugh, Pearlman and Hauck (1991), who showed that after an adjustment, there was an improved brain stem evoked response which indicated that neural messages were travelling through the brain stem quicker or with less delay. Terrett (1993), has proposed that cervical manipulative therapy results in augmented cerebral blood flow, which culminates in hibernating areas of the brain becoming functional again. The higher cognitive skills tend to be affected by the decrease in blood flow. Cognitive skills are vital to the process of learning, spelling and reading. Edublox is a company that has special training programmes to develop these skills to maximize their potential.

The aim of this study is to determine the effects of cervical manipulations combined with Edublox training versus Edublox training alone on visual spatial memory. The focus of the study would be to determine whether chiropractic cervical manipulation has a significant effect on mental function and visual memory when combined with Edublox training.

The study will include a total of thirty participants split into two groups, one receiving Edublox training and the other receiving Edublox training combined with cervical spine manipulations. Participants approximately between the ages of ten and thirteen years of age will be included in this study. Participants in both groups will undergo a Case History, Full Physical Examination, Cervical Regional Examination, subjective, and objective measurement on the first visit. The manipulation group will receive spinal manipulative therapy followed by both groups receiving the same Edublox training session to limit variation. The participants shall receive an intense program of Edublox training, every day for the duration of five days and the combined group will receive adjustment every other day. The research will be conducted at the premises of the relevant school. Subjective and objective measurements will be taken at the beginning and at the end of the five days. The subjective measurement will include an Observer Memory Questionnaire – Parent Form that will be completed by the parent of the child based on their view of their child's memory.

The combined use of the Edublox program and cervical manipulative therapy should show a greater improvement than the improvement seen with the individual components used in isolation. Both groups should show significant improvement in verbal, non-verbal and full IQ. The study may indicate that the cerebral dysfunction therapy is viable as well as illustrate that chiropractic manipulative therapy may or may not have an effect on cerebral dysfunction.

2. LITERATURE REVIEW

2.1 Introduction to Chiropractic

According to the World Federation of Chiropractic (2009), Chiropractic is a health profession that relates to the diagnosis, treatment and prevention of biomechanical disorders of the musculoskeletal system and the effects of these biomechanical abnormalities on the nervous system. Chiropractic is a hands-on, alternative, drug-free and surgery-free approach to health that dates back to 1895 (Chiropractic Association of South Africa, 2012). There is an emphasis on manual treatments such as Chiropractic manipulative therapy and soft tissue therapy (World Federation of Chiropractic, 2009).

2.2 Vertebral Subluxation Complex

The Vertebral Subluxation Complex (VSC) is the name given to a lesion that implies that there is a change in structure and function. The VSC is initiated by segmental dysfunction which progresses to intervertebral subluxation and spinal degeneration. Segmental dysfunction refers to a localized lesion that shows evidence of asymmetry, malalignment or reduction of motion (Leach, 1994). The vascular component of the VSC model plays a significant role in dysfunction; this is illustrated when vertebral arteries tend to form loops and kinks within the transverse canal which is believed to culminate in signs and symptoms of cerebral ischaemia (Gatterman, 1995).

2.3 Chiropractic Manipulation

Chiropractic manipulation is a manual technique that involves a high velocity, low amplitude thrust applied to an area of segmental dysfunction (Sandoz, 1976). The paraphysiological zone of movement is where joint play occurs and it is at this zone that the thrust is used to separate the opposing articular surfaces resulting in a cavitation. Apart from the many common effects of Chiropractic adjustment, there is evidence to show that adjusting the upper cervical spine improves conduction velocity through axons in the brain stem, successfully altering mental function (Thomas and Wood, 1992). Terrett (1993), has proposed that cervical adjustment therapy results in augmented cerebral blood flow, which

culminates in hibernating areas of the brain becoming functional again. In a few cases, there are adverse reactions to chiropractic manipulation which can range from benign, self-limiting events to more severe events such as vertebrobasilar artery stroke and disc herniations. The benign, self-limiting events are generally mild to moderate in intensity and include post manipulation soreness, radicular pain and less commonly; tiredness, dizziness and nausea (Rubinstein, 2008).

2.4 Brain Hibernation (Cerebral Dysfunction/Ischaemic Penumbra)

The theory of brain hibernation was advanced by (Terrett, 1994) based on findings by Gorman that proposed that a decreased blood flow to the brain resulted in decreased brain functioning. The theory proposes that the reduction in blood flow does not affect core brain functions such as walking, talking and eating but more the sophisticated, higher cognitive brain functions such as concentration, peripheral vision, memory and attention span. Blood flow is decreased due to constrictions of the vertebral arteries due to stress in the neck, originating from misaligned or malfunctioning vertebrae (Gatterman, 2005). Central to this theory is the condition known as ischaemic penumbra, which describes cerebral blood flow between normal blood flow, (allowing normal brain function) and low blood flow (causing irreversible damage). In this "penumbra" state, neurons of the brain are paralysed and no longer function adequately (Astrup, J., Siesjo, B.K. and Symon, L., 1981). Terrett (1993), has proposed that cervical adjustment therapy results in augmented cerebral blood flow, which culminates in hibernating areas of the brain becoming functional again. This would have major implications for education/learning and performance enhancement (physical and mental).

2.5 Edublox

The Edublox Intensive Holiday Course is primarily used to improve cognitive abilities – attention, visual processing and memory. The programme came under scrutiny in a study when the programme was used on ten students and the results were astounding. After the two-week programme, the verbal, non-verbal and full scale IQ results were significant in that they displayed increases on IQ scores of the learners. Initially, the mean verbal IQ score was 85.4, and after the programme had increased to a value of 91.0. The initial mean non-verbal score was 92.6 and increased to a value of 105.1 after the programme. Finally, the mean full scale IQ had risen from 87.0 to 97.1 after thirty to forty hours of tuition. The programme improves cognitive skills and therefore reading, learning and spelling ability (Edublox, 2012).

2.6 Visual Memory

A relationship between attention and memory has been put forward by Desimone (1996); this would show that if cognitive skills are affected by cerebral dysfunction, they all will not function optimally.

3. AIMS

The primary aim of this study is to determine the effects of cervical manipulations combined with Edublox training versus Edublox training alone on visual memory. The secondary aim of this study is to support or oppose the theory of cerebral dysfunction and illustrate that Chiropractic manipulation is effective or ineffective in treating the symptoms of cerebral dysfunction or brain hibernation.

4. METHODOLOGY

4.1 Study Design

4.1.1 Participant recruitment

A short presentation will be delivered to a group of students providing information about the Chiropractic profession and what they can expect from a Chiropractor when receiving treatment. The presentation will give an overview of the Edublox programme and what the participants can expect from this study. The students will receive a Comprehensive Information Booklet (Appendix C) to take home to their parent/s or guardian/s to make an informed decision whether they desire their child to participate in this study. Should the parent/s or guardian/s consent to their child participating, they will return a signed consent form supplied in the Comprehensive Information Booklet (Appendix C) to secure a place in this study.

4.1.2 Sample selection and size

A minimum of thirty participants that are approximately between the ages of ten and thirteen years of age will take part in this study. Initial consultation will be performed with assistance from the child's parents whom will be present. This age group is desired because according to an experienced educator, Susan Du Plessis, the children are driven to excel and are goal oriented at this age. In addition, a large amount of cognitive development is still taking place in this age bracket and tends to slow down as age advances. Thus, she believes that older children may not respond as well to participating in this study during the holiday. The study will be conducted on the premises of the relevant school. The participants will be divided into two groups, with equal male to female and age

ratios within each group. Should the result of this study be favourable, then a broader age group can be included for future research.

4.1.3 Inclusion criteria

Inclusion criteria for prospective participants include:

- Participants are required to sign the Assent Form (Appendix B) to participate in this study.
- Parent/s or guardian/s of the participants are required to sign the Information and Consent Form (Appendix A) to allow full participation of their child in this study.
- Participants must be approximately between the ages of ten and thirteen years of age to be included in the study.

4.1.4 Exclusion criteria

Exclusion criteria for prospective participants include:

- Participants who are contraindicated to Chiropractic cervical manipulative therapy (Appendix F).
- Participants who are receiving Chiropractic treatment elsewhere who may alter the readings.
- Participants who are currently partaking in any program similar to or may resemble Edublox, or any program that is aimed at cognitive skill development.
- Any participants that do not conform to the inclusion criteria.

4.1.5 Randomisation

Participants will be assigned a number and their chronological age calculated. Once all participants' chronological age has been determined, the participants will be assigned into two groups with equal age and male to female ratios. Both groups will randomly be assigned a group letter by an external source which will establish which group receives cervical adjustment therapy.

4.2 Treatment Approach

All visits that take place will be supervised by a University of Johannesburg representative that is qualified in the field of Chiropractic. Dr Hay or Dr Landman have agreed to supervise the researcher at the relevant school's premises.

4.2.1 First visit

Each participant will go through the process of the following:

- Signing of the Assent Form (Appendix B) by participant.
- Signing of the Information and Consent Form (Appendix A) and parent/guardian.
- Complete a Case History Form with the researcher.
- Complete a Physical Examination Form with the researcher.
- Complete a Cervical Regional Examination.
- Parent/Guardian of participant completes Objective Memory Questionnaire – Parent Form (Appendix D).
- The qualified occupational therapist will assess the child using The Test for Visual Perceptual Skills.

The manipulation group will receive the appropriate manipulations based on the restrictions found during motion palpation of the cervical spine. Both groups will then proceed with the Intensive Holiday Programme run by Edublox. The Intensive Holiday Programme will be held at the chosen school's premises. Permission by the principal and the Edublox representative (Henk Du Plessis) has been granted to the researcher to conduct research on the course attendees at the school premises.

4.2.2 Follow-up visits

Follow-up visits comprise of two components namely the Edublox component and the Chiropractic treatment component. Both groups will be specially trained by an Edublox professional that will coordinate the five hour per day course from Monday to Friday for a week for both groups. The manipulation group will receive Chiropractic manipulative therapy every second day for the five day period i.e. Monday, Wednesday, Friday. The researcher will assess each partaker in the adjustment group with motion palpation to identify any restrictions. This will then be followed by the completion of a S.O.A.P note before treating the identified restrictions with the appropriate adjustments.

4.2.3 Final visit

Each participant will go through the process of the following:

- Parent/Guardian of participant completes Observer Memory Questionnaire – Parent Form (Appendix D).
- The qualified occupational therapist will assess the child using The Test for Visual Perceptual Skills.

4.2.4 Subjective data

The Observer Memory Questionnaire was initially designed to collect significant-other ratings of adults with epilepsy (Levick, 2010). The Observer Memory Questionnaire–Parent Form (Appendix D) was an attempt to further research in paediatric everyday memory by introducing a new parent-report questionnaire. The properties of the scale were explored in a normative sample and clinical sensitivity was examined in children with temporal lobe epilepsy in which memory deficits are often comorbid. It was expected by the authors that the Observer Memory Questionnaire-Parent Form would have sound internal validity in the normative sample and that children with temporal lobe epilepsy would perform below normative standards. The age group in which the normative values were established were between the ages of 6 and 16 years of age (Gonzales et al., 2008). A review of observer memory was established by Levick (2010) who claimed that the test is valid and has good internal consistency although research is required to determine sensitivity and specifity in order to use the questionnaire as a screening tool.

4.2.5 Objective data

The test for Visual-Perceptual Skills is a non-motor cognitive test created by Nancy Martin, PhD, used to test patients between the ages of four and eighteen. It is used to test a child's visual perceptual strengths and weaknesses and is a vitally important ability that permits one to make sense of what and where it is seen. Two subtests will be made use of in the category of: visual memory and visual sequential memory. Results will be recorded on the data collection form (Appendix E)

5. DATA ANALYSIS

Participants will be assessed by the occupational therapist and their chronological age determined in order to get a z-score. This data will be given to STATKON and further statistical analysis will be done. See attached statistics report.

6. ETHICAL CONSIDERATIONS

All participants who wish to partake in this particular study will be requested to read and sign the Information and Consent Form specific to this study as well as obtain full permission and consent from their parent or guardian. The Information and Consent Form will outline the names of the researcher, purpose of the study and benefits of partaking in the study, participant assessment and treatment procedure. Any risks, benefits and discomforts pertaining to the treatments involved will also be

explained and that the participant's safety will be ensured (prevention of harm). The Information and Consent Form will also explain that the participant's privacy will be protected as only the doctor, patient and clinician will be in the treatment room and that anonymity will be ensured as the patient information will be converted into data and therefore cannot be traced back to the individual. The form will also state that standard doctor/patient confidentiality will be adhered to at all times when compiling the research dissertation. The participants will be informed that their participation is on a voluntary basis and that they are free to withdraw from the study at any stage. Should the participant have any further questions, these will be explained by the researcher; contact details will be made available. The participants and the parents/guardians will then be required to sign the Information and Consent Form, signifying that they understand all that is required of them for this particular study. Results of the study will be made available on request.

With regards to this particular study, participants may experience post adjustment soreness which is normal.

Participants will be referred when necessary.

7. POSSIBLE OUTCOMES

In this study, the combined training and Chiropractic treatment may show significant improvement and may be effective in treating learning disabilities. It may also be possible that the educational performance and academic achievement may be increased through development of mental function and cognitive skill abilities. In doing so, this study hopes to demonstrate a relationship between cervical spine manipulation and mental function which paves the way for broadening the Chiropractic scope of practice. This may be in the form of working in conjunction with educational specialists to treat learning disabilities.

8. TIME AND COST BUDGET

8.1 Time Budget

Topic Approved	23rd February 2012
Formulate Proposal	4th - 8th March 2012
Proposal Approved	22nd August 2012
Research Study	1th-5th October 2012
Compile Research Dissertation	6thOctober – 31st November 2012
Hand Dissertation in for Final Marking	1st January 2012

8.2 Cost Budget

Petrol to and from school	R500.00
30 Patient Files (R5per file)	R150.00
30 Consent forms (0.30c per page)	R9.00
30 Case History Forms (R0.60 per complete form)	R18.00
30 Full Physical Examinations (R1.20 per complete form)	R36.00
30 Cervical Regional Examinations (R0.30 per complete form)	R9.00
30 Child Memory Questionnaire (R1.50 per questionnaire)	R45.00
100 Information Booklets for parents of participants (R1.50 per booklet)	R150.00
30 SOAP notes (R0.30 per page)	R9.00
30 Everyday Memory Questionnaire (R0.30 per questionnaire)	R9.00
Total	R935.00

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