ORIGINAL RESEARCH

Improved Brain Development in 37 Children Undergoing Chiropractic Care for Correction of Vertebral Subluxation: A Retrospective Analysis of Health Outcomes

Sarah Hock, DC, CACCP[1] & Amy Spoelstra, DC[2]

Abstract

Objective: To describe the care and outcomes of subluxation-based chiropractic care for several children with Neuro-Deflective Disorders™ associated with development.

Clinical Features: Chiropractic care of children with Neuro-Deflective Disorders™ via subluxation-based chiropractic care using neurological, developmental, functional, structural, and subjective parental outcome assessments.

Interventions and Outcomes: Vertebral subluxations when found at specific spinal segments were adjusted. During care, patient outcomes were measured via both objective and subjective measurements for initial and re-evaluation purposes. At the conclusion of each care plan patients' outcomes showed marked improvement in both objective and subjective measurements demonstrating improvement in the quality of life for these patients.

Conclusion: Chiropractic adjustments, which focus on the reduction of vertebral subluxation, appeared to be beneficial for children with Neuro-Deflective Disorders™. When measuring and assessing quality of life for these patients and families there was a positive correlation between chiropractic care and improvement in measured areas.

Key words: *Subluxation, adjustment, pediatric, Neuro-Deflective Disorders™, development, neurodevelopmental disorders*

Introduction

In this study we address two main questions both initially and as a continuous outcome assessment measure. We want to collect data to determine if there are clinical indicators demonstrating alterations in input, processing, and output as it relates to a communication between the brain and the body. We are also interested in assessing the tools in which a person is primarily skilled in, to process their world and how that relates to their ability to efficiently engage, connect, and learn from their environment in a sophisticated way.

1. Private Practice of Chiropractic, Boiling Springs, SC
2. Private Practice of Chiropractic, Coeur d'Alene, ID

In this study we collected outcomes associated with development and processing in pediatric patients.

We know that subluxation can alter input, increasing afferent input to the nervous system, lowering adaptive thresholds, and creating hypersensitivity to "normal" stimuli. Altering input thus alters output; it is logical to think that this change in output can be measured via the functionality of the nervous system and, in this study, developmental skills and how the body interacts with the external environment.[1]

Chiropractic is founded on the assessment and correction of interference in the communicative neurology between the

brain and the body – this is termed vertebral subluxation. It is important to focus on how the brain receives, processes, and sends information about the body and the outside world. We know that when the body is stressed, it must adapt to increased demand.[2,3] When there is too much demand (stress), it may lead to a subluxation. The stressors that lead to subluxation can be anything that changes the biomechanical, psychological, neurological, and/or chemical aspects of how the brain and body function.[4]

The framework of chiropractic is based on the premise that alteration of the normal biomechanics of the spine and its related structures adversely affects the functioning of the nervous system and is reflected as consequences of health/quality of life.[5] Subluxation puts abnormal stress on the muscles, tendons, ligaments, nerves, and discs, forcing them to undergo changes to adapt. The adaptive findings are a window into how the body is functioning and processing via somatomotor and visceromotor activity.[6] These findings can be neurological, functional, and structural.

The articular dysfunction component (kinesiopathology) of the vertebral subluxation results in altered afferent input to the central nervous system (CNS) which modifies the way in which the CNS processes and integrates all subsequent sensory input. This processing (i.e. sensorimotor integration) is a CNS function that appears vulnerable to altered inputs. Recent studies have shown that chiropractic care improves sensorimotor filtering, cortical, and cerebellar motor processing, and multisensory processing, all of which may be important in neurodevelopment.[7,8] Subluxation alters input into the CNS thus altering output.

Subluxation alters the input being sent to the brain, which in turn alters the information the brain receives, affecting how it processes, learns, grows and sends information. Since input, processing and output to and from the brain is vital for typical development, it is reasonable to deduce that subluxation altering afferent input and sensorimotor integration would lead to altered developmental patterns.[9] Altered patterns of the typical developmental trajectory of early life may be demonstrated in alterations in reflex integration, gross motor function, fine motor function, oculomotor control and visual cognitive ability.[10,11]

Further effecting brain development, the stress response creates a fight-flight-freeze response or a shift to sympathetic dominance within the body. This shift not only affects how we function neurologically but also alters functioning at the most basic levels in our body. On a cellular level, a cell cannot be in both survival (sympathetic) and growth functioning at the same time.[12] If a child needs efficient growth from birth to adulthood neurologically to move through development, it would not be conducive to typical development to be in a chronic state of stress/sympathetic mode of functioning during early developmental life. Since neurological growth guides physical growth, it is imperative we look to neurological efficiency and alterations in neurological function when assessing growth and development.[13,14]

Humans develop from infancy to adulthood in a hierarchical way starting with more primitive processing and moving toward more sophistication in our ability to engage, learn and connect with our world. This development first starts with primitive reflexes (infantile movement reflexes) to survive, learn, and process the world.[15] A child then moves toward more sophistication with the development of movement and touch systems, with auditory processing, and then visual cognitive function, which leads to the ability to reason and engage in more sophisticated manners, engage in executive function, improve predictive capacity, connect, and communicate outside of oneself.

The tools that an individual possesses to process their world at any given time in life dictate the way they behave, learn, and connect with their surroundings. As children grow and develop, they learn new and more complex ways to learn, process and communicate with the world; this is dictated by the tools they develop because of their developmental trajectory during life.

These tools/skills show demonstrated and observable characteristics in a child from motor functioning to self-awareness and much more.[16] Many of the tools/skills that are developed display behaviors that are more efficient, promote learning, and enhance socialization as we develop.[17] The way in which we move through this developmental hierarchy and thus develop more sophisticated tools during early life can be impacted by altered or inefficient neurological experience.[18]

A subluxation may lead to altered input being sent to the brain and processed resulting in altered perception and output, thus changing the trajectory a child moves through this hierarchy of development. We are also interested in the potential imbalance in the autonomic nervous system that can be a result of a subluxation and determining how this may alter typical childhood development.[19-21]

If increased demand (physical, chemical, or emotional stress) is placed on a child in a capacity that the child is unable to meet, a response or adaptive change can happen in the body.[22] Subluxation is a failure of adaptation that can be a result of demand exceeding the ability to process or meet demand; and this subluxation can result in an increased stress response and an altered afferent input to the brain from the body. If this occurs during a child's early life, the architecture of the developing brain can change in a way that alters the movement through the developmental trajectory. This can be measured and observed by assessing and monitoring the tools a child is using to process their world in comparison to typical developmental milestones.

The tools to be assessed include primitive reflexes, gross motor function, fine motor function, auditory-verbal function, oclulo-motor control and efficiency, socialization tools, communication tools, behavioral tools, academic ability, and emotional control.[10-11, 14-18] The neurological, structural, and mechanical response as a result of the subluxation can be measured and observed through postural changes, radiographs and other imaging, range of motion alterations, heart rate variability, paraspinal thermography readings, and sEMG readings.[23]

If a child's developmental trajectory is altered during early life, this may impact the tools they develop to engage, learn,

and connect with their world that leads to less efficient tools being used, which we refer to as a Neuro-Deflective Disorder™.[15,24]

For this study, we describe alterations in processing, engaging, learning, and connecting with ones' environment inefficiently because of the stress response cascade impacting development as a Neuro-Deflective Disorder™. This allows us to assess the observable behaviors in a more "whole to part" clinical perspective as opposed to looking at each "behavior" as a symptom to be covered. This language allows for clinical, behavioral, educational, and parenting to be approached from a brain-based perspective to allow for the discovery of reasons for challenges as opposed to deficit driven interventions which is more in alignment with current neuroscience and behavioral science in the field of childhood development.[12, 20, 25-29]

Autonomic balance dysfunction, abnormal reflexes, coordination, oculo-motor function abnormalities, and visual perceptual difficulties are all aspects of a neuro-developmental delay of a brain which is functioning using lower developmental tools.[30] Recent studies have shown that subluxation-based chiropractic care improves sensorimotor filtering, cortical and cerebellar motor processing, and multisensory processing, all of which may be important in neurodevelopment.[7,8] If chiropractic care can improve these things, then logically subluxation is altering these developmental functions.

Given the nature of the neurological changes associated with children that have Neuro-Deflective Disorder™ and the growing body of evidence that suggests that chiropractic care may influence neurological function (unaltered input). It is possible that chiropractors may play a role in enhancing the neurological function and development of these individuals.

This study is about the chiropractic care of children that demonstrate Neuro-Deflective Disorders™. Traditional care for children like this consists of behavior and communication approaches, dietary approaches, medication, and complementary and alternative care (CAM).[31] Chiropractic is one CAM approach to the care of these children. The deflections present a unique challenge for a practitioner in meeting all the needs of a patient, in not only gathering findings but also assessing outcomes (objective and subjective).

In this study, subluxation was determined by neurological, functional, and structural assessments (see methods section). Using this analysis, patients were adjusted at subluxated spinal segments. The aim of chiropractic care was to correct vertebral subluxation and assess the patient's objective and subjective outcome changes, which subsequently improved the patient's quality of life and trajectory of development. This is supported by several population studies.[32-35] Informed consent for care and research was obtained for the patients and documented along with IRB approval for this case series.

Methods

On each normal office visit a chiropractic assessment of palpation and leg checks was performed, with subluxation corrected when necessary. All other exams were used on initial exam and re-exams to monitor outcomes.

Every Visit:

1. Static, muscle, motion palpation
2. Leg Checks

Initial and Re-exam visits:

3. Thermography
4. HRV
5. sEMG (Insight)
6. Posture/Gait assessment
7. ROM (active assessment)
8. Primitive reflex assessment - Moro, STNR, ATNR
9. Gross motor assessment - basic walk, heal to toe walk, cross body skip
10. Fine Motor assessment - Fine motor tasks using finger taps, grip style and control
11. Eye movement assessment - Fixation, convergence, divergence, tracking
12. Visual Cognitive assessment - two story questions are performed to assess processing and ability to create imagery, recall and retain imagery
13. Parent survey

The data reported herein was derived from a total of 37 pediatric patients with Neuro-Deflective Disorders™ seen at one chiropractic office. All patients received chiropractic care for vertebral subluxations found through clinical findings (Methods 1-7) and outcomes were monitored via Methods 8-13.

Average care plan lengths were four months for the first plan of care, four months for the second plan of care, three months for the third plan of care and two months for the fourth plan of care for participants in this study. Each plan of care was individualized for the patient and varied in duration, thus the averages for each care plan are stated above. Not every patient went through four re-evaluations. On average most participants made it through two care plans. All data is based on the overall responses.

Results

Observations indicated that correcting subluxation, while utilizing clinical and educational tools when necessary to support healthy development, showed patient improvement in autonomic nervous system balance and subluxation patterns, as well as improved efficiency in processing, engagement, learning and connection to the patients' surroundings. These findings are measured and observed through clinical outcomes (see 3-12 above), as well as parent surveys which monitor activities of daily living for the participants.

Exam outcomes (Methods 8-12): primitive reflexes, gross motor skills, fine motor skills, auditory verbal skills, eye movement and visual cognitive skills were documented as "not there yet" if the patient was still working on the skill based on the tests or "within normal limits" if the patient had met that skill based on the tests.

Participants outcomes are listed as "not there yet" when they are not at the developmental level for age and readiness in an outcome skill, as such, they are listed as "within normal limits" when they have grasped a skill for developmental age and readiness. Changes were documented as improved or not

improved based on the tests for each outcome skill. The results are in Chart 1.

Parent survey results were taken at the beginning of care and the end of each plan of care. Results for each outcome was documented initially by the parent as "Y" if the outcome was an issue for the patient and thereafter as "B" for better, "U" for unchanged, and "W" for worse on the subsequent evaluations. The results of the parent survey are in Table 1. The total responses with a "Y" in each outcome are listed in the table along with responses for "B" during each re-eval and percentages of improvement over all the plans of care and re-evaluations. The percentages of those that were "U" or "W" are also noted.

For the purpose of this study the parent survey results are reported in relation to learning outcomes, intra/interpersonal skills, sensory outcomes, and general health outcomes. Charts 2-5 map out the percentage of children that showed improvement in each outcome category group: learning, intra/interpersonal skills, sensory and general health with respect to each re-evaluation.

Learning outcomes included ease with completing homework, ability to concentrate on a task/goal, handwriting, reading comprehension, organization/planning, spelling, understanding concepts, vocabulary and expression, attention/focus, and participation in extracurricular activities, are documented in Chart 2. Overall, there was steady improvement in learning outcomes. The overall average of improvement for all plans of care was 64.8%. Participants that had four re-evaluations experienced the most improvements in all categories documented as an issue on the parent survey. This could be attributed to it taking a longer time to remove neuronal interference.

Intra/interpersonal skills outcomes include feelings about school, relationships with peers, mood (self-esteem), anxiety, rigidity/demand for sameness, family relationships, loss of temper/emotional outbursts, and ability to self-regulate emotions which are documented on Chart 3. There was steady improvement in these skills set with an overall average of improvement for all plans of care of 74.12%.

Sensory outcomes include limited food choices, sensory sensitivity, and sensitivity to pain which are documented on Chart 4. This outcome set had almost linear improvement throughout the re-evaluations with an overall average improvement of 62.60%.

General health outcomes include getting to sleep, quality of sleep, amount of sleep, eating habits, digestive health overall, frequency of bowel movements, and energy levels. These outcomes showed steady improvement until the fourth re-evaluation. The average improvement over all the care plans was 47.92%.

Discussion

As development follows a normal trajectory, more sophisticated tools are developed to process, engage, learn, and communicate with the world. The tools are classified into categories under primitive reflexes, gross motor skills, fine motor skills, auditory verbal skills, eye movement skills and visual cognitive skills. As a child moves through development along a normal trajectory, each of the skills above provide information that is integrated, and a more sophisticated skill is developed. When interference was removed (subluxations removed) we saw improvements in each of these categories as more unaltered information was collected by a developmental tool then processed, resulting in new more sophisticated tools.

It is assumed that children involved in this study suffer from neurological interference caused by subluxation that may contribute to their Neuro-Deflective Disorders™. This neurological interference has hindered development of the child/adult, interfering with their body's ability to process, engage, learn, and connect with the world around them.

Chiropractors correct vertebral subluxations in an attempt to remove neurological interference. It can be hypothesized that allowing unaltered nerve impulse information up and down the spinal cord to the brain, thus creating more neurological integration, permits the body to better process, engage, learn, and communicate with the world around it, thus, moving children more efficiently through developmental trajectories.

When the participants in this study were checked and adjusted, several positive changes took place associated with their developmental abilities to process, engage, learn, and communicate with their world. The qualitative data in Table 1 lists many changes. Some changes could be attributed to natural development, but the percentage of change insinuates a higher level of correlation based on research and CAM treatments associated with these populations. Improvements in the children's ability to process, engage, learn, and communicate are associated with primitive reflexes, gross motor, fine motor, eye movements, auditory verbal skills, and visual cognitive skills are shown in Chart 1. Since physical development is guided by neurological development, improvements in physically developmental tools are demonstrated.[13,14]

Though the average length of care plan was four months, it can be noted that not every participant made it through to the third or fourth re-evaluation. 73% of participants made it through a second re-evaluation, with 21% making through a third re-evaluation and 6% making through to the fourth re-evaluation.

It can be noted that all areas of outcomes measured shown in Chart 1, demonstrated improvement in all categories except for fine motor skills outcome, which had the same levels of improvement as no improvement over time. This may be due to many factors. However, research states that early introduction of technology may increase fine motor skills past that of normal development readiness quickly.[36,37] Many children and adults with Neuro-Deflective Disorders™ are avid users of technology.

The participants in this study all had Neuro-Deflective Disorders™ and had already done traditional therapies for the deflections with minimal improvements. Although some of these improvements could be attributed to normal developmental trajectory changes over the plan of care, as a whole body of change, the results from the chiropractic care removing neurological interference are remarkable for these participants. The changes in developmental tools and quality of life cannot be discounted.

Leading authorities in the field of Neuro-Deflective Disorders™ currently believe that the brain and dysfunction of the neuronal network accounts for some developmental changes and may be due to wide variety of insults (demands/stress) to the developing brain.[38-41] This thought correlates with the chiropractic principle that health is enhanced by removing neurological interference through adjusting subluxations.

Conclusion

The intended benefits of this study are to add to the current knowledge of procedures utilized by pediatric chiropractors that work with patients with Neuro-Deflective Disorders™; the principal aim of care for this study is the correction of vertebral subluxations. The subluxations determined for these patients were associated with neurological, functional, and structural adaptive changes.

Reduction of vertebral subluxation proved successful in improving the patient's quality of life measured by parent surveys. This led to significant improvements in neurological and developmental functioning as seen on both parent surveys and developmental tool outcomes. The knowledge gleaned from this study will further inform the effective care of pediatric patients and the education of future chiropractors.

This study observed the learning, intra/interpersonal skills, sensory issues, and general health changes in children with Neuro-Deflective Disorders™. Additionally, changes in primitive reflexes, gross and fine motor skills, auditory verbal skills, eye movement and visual cognitive skills demonstrate that chiropractic care correcting vertebral subluxations correlates to developmental improvements. The observations and data collected on these children who have Neuro-Deflective Disorders are encouraging and suggests that follow up studies on the link between chiropractic care, vertebral subluxation, the nervous system, and development is warranted.

References

1. Kent, C. Proposed Neurobiological Processes Associated with Models of Vertebral Subluxation: Disafferentation, Dyskinesia, Dysponesis, Dsyautonomia, Neuroplasticity and Ephaptic Transmission. Arch Neurol & Neurosci. 3(1):2019.
2. Felitti et. al. *Relationship of Childhood Abus and Household Dysfunction to Many of the Leading Causes of Death in Adults: The Adverse Childhood Experiences (ACE) Study.* American Journal of Preventive Medicine. 14(4):1998(245-258).
3. Gustafson C. (2017) *Bruce Lipton, PhD: The Jump from Cell Culture to Consciousness.* Integrative Medicine (Encinitas, Calif.), 16(6), 44-50.
4. Haavik, Heidi. The Reality Check. Havvik Research, 2014
5. Alcantara J, Plaugher G, Lopes MA, Cichy DL. Spinal subluxation. In: Anrig C, Plaugher G, eds. *Pediatric Chiropractic.* Baltimore, MD: Williams and Wilkins; 1998.
6. Pickar JG. Neurophysiological effects of spinal manipulation. *Spine J*. 2002 (Sept-Oct),2(5):357-371.
7. Haavik H. Murphy B. The role of spinal manipulation in addressing disordered sensorimotor integration and altered motor control. *J Electromyogr Kinesiol*. 2012 (Oct); 22(5): 768-76.
8. Dailgadu J. Haavik H. Yielder PC. Baarbe J. Murphy B. Alterations in cortical and cerebellar motor processing in subclinical neck pain patients following spinal manipulation. *J Manipulative Physiol Ther*. 2013 (Oct); 36(8): 527-37.
9. Gouleme, et. al. *Impact of Somatosensory Input Deficiency on Subjective Visual Vertical Perception in Children with Reading Disorders*. Front. Neurol. 2019; 10:1044.
10. Blythe, SG. Attention, Balance and Coordination: The A.B.C. of Learning Success. Wiley: 1st Edition, 2009.
11. Lane, Kenneth. *Visual Attention in Children: Theories and Activities*. SLACK Incorporated; 1st Edition, 2012.
12. Lipton, Bruce H. *The Biology of Belief: Unleashing the Power of Consciousness, Matter & Miracles*. 10th anniversary edition. Carlsbad, California: Hay House Inc, 2016.
13. Hall, Zachary. Tropepe, Vincent. *Movement maintains forebrain neurogenesis via peripheral neural feedback in larval zebrafish.* eLife. 2018; 7:e31045.
14. Adolph, Karen. Franchak, John. *The development of motor behavior*. Wiley Interdiscip Rev Cogn Sci. 2017 Jan; 8(1-2): 10.1002/wcs.1430.
15. Goddard, Sally. *Reflexes, Learning and Behavior: A Window into the Child's Mind: A Non-Invasive Approach to Solving Learning and Behavior Problems.* Fern Ridge Pr; 1st Edition. 2005.
16. Blythe, Sally Goddard. *Neuromotor Immaturity in Children and Adults: The INPP Screening Test for Clinicians and Health Practitioners.* Wiley-Blackwell; 1st Edition. 2014
17. Porges, Steven. Furman, Senta. *The Early Development of the Autonomic Nervous System Provides a Neural Platform for Social Behavior: A Polyvagal Perspective*. Infant Child Dev. 2011 Feb;20(1): 106-118.
18. Sosa, AV. *Association of the Type of Toy Used During Play with the Quantity and Quality of Parent-Infant Communication*. JAMA Pediatr. 2016;170(2):132-137.
19. Quigley, Kelsey. Moore, Ginger. *Development of cardiac autonomic balance in infancy and early childhood: A possible pathway to mental and physical outcomes.* Developmental Review. 2018(49):41-61.
20. Porges, Stephen. The Polyvagal Theory: Neurophysiological Foundations of Emotions, Attachment, Communication, Self-Regulation. W.W. Noton & Company, 2011.
21. Markham JA, Greenough WT. *Experience-driven brain plasticity: beyond the synapse*. Neuron Glia Biol. 2004 Nov;1(4):351-63.

22. Laplante DP, Brunet A, Schmitz N, Ciampi A, King S. Project Ice Storm: prenatal maternal stress affects cognitive and linguistic functioning in 5 ½-year-old children. J Am Acad Child Adolesc Psychiatry. 2008 Sep;47(9):1063-72.
23. Kim HG, Cheon EJ, Bai DS, Lee YH, Koo BH. Stress and Heart Rate Variability: A Meta-Analysis and Review of the Literature. Psychiatry Investig. 2018:15(3):235-245.
24. Spoelstra, A. (2018) FOCUS Level 1 & 2 [PowerPoint Slides]. Focus Academy.
25. Purvis KB, Cross DR. Dansereau DF, Parris SR. *Trust-Based Relational Interventions (TBRI): A Systemic Approach to Complex Developmental Trauma*. Child Youth Serv. 2013;34(4):360-386.
26. Goddard Blythe, S. The Well Balanced Child: Movement and Early Learning. Hawthorne Press, 2nd Edition. 2005.
27. Delahooke, M. Beyond Behaviors: Using Brain Science and Compassion to Understand and Solve Children's Behavioral Challenges. PESI Publishing, 1st Edition. 2019.
28. Hughes, D. Brain-Based Parenting: The Neuroscience of Caregiving for Healthy Attachment (Norton Series on Interpersonal Neurobiology). W.W. Norton & Company, 2012.
29. Siegel DI, Bryson TP. The Whole-Brain Child: 12 Revolutionary Strategies To Nurture Your Child's Developing Mind. Bantam Books Trade Paperbacks. 2012
30. Blythe, Sally. The Importance of Reflexes in Developmental Delays. *New Developments*: 2001 (Spring); 6(4).
31. Austism Spectrum Disorders (ADSs): Treatment Available at https://www.cdc.gov.ncbddd/autism/treatment/html.
32. Sandefur R. The effect of chiropractic adjustments on the behavior of autistic children: a case review. *ACA Journal of Chiropractic* 1987 (Dec); 24(12): 21–25.
33. Rubinstein H. Case study-autism. *Chiropractic Pediatrics* 1994 (Apr); 1(1).
34. Rangnath M. Kentuckiana: what it is, what it can become. *ICA Review* 1991 (July/August). (47:4): 21-29.
35. Aguilar A, Grostic J, Pfleger B. Chiropractic Care and Behavior in Autistic Children. *J of Clinical Chiropractic Pediatrics*. 2000: 5(1):293-304.
36. Bedford, R., Saez de Urabain, I., Cheung, C., Karmiloff-Smith, A., & Smith, T. Toddlers' fine motor milestone is associated with early touchscreen scrolling. Frontiers in Psychology, 7(1108), 1-8.
37. Russo-Johnson, C., Troseth, G., Duncan, C., & Mesghina, A. (2017, April 12. All tapped out: Touchscreen interactivity and young children's word learning. Frontiers in Psychology, 8(578), 1-15.
38. Hashimoto T, et al. Brainstem and cerebellar vermis involvement in autistic children. *Journal of Child Neurology* 1993;8 (April):153.
39. Tuchman R. Epilepsy, language and behavior: clinical models in childhood. *Journal of Child Neurology* 1994; 9(1):99.
40. Matson J. Autism in children and adults: etiology, assessment, and intervention. Pacific Grove, CA: Brooks/Cole Publishing Company, 1994.
41. Gordon AG. Debate and argument: interpretation of auditory impairment and markers for brain damage in autism. *Journal of Child Psychiatry* 34(4):589.

Appendix

Chart 1.

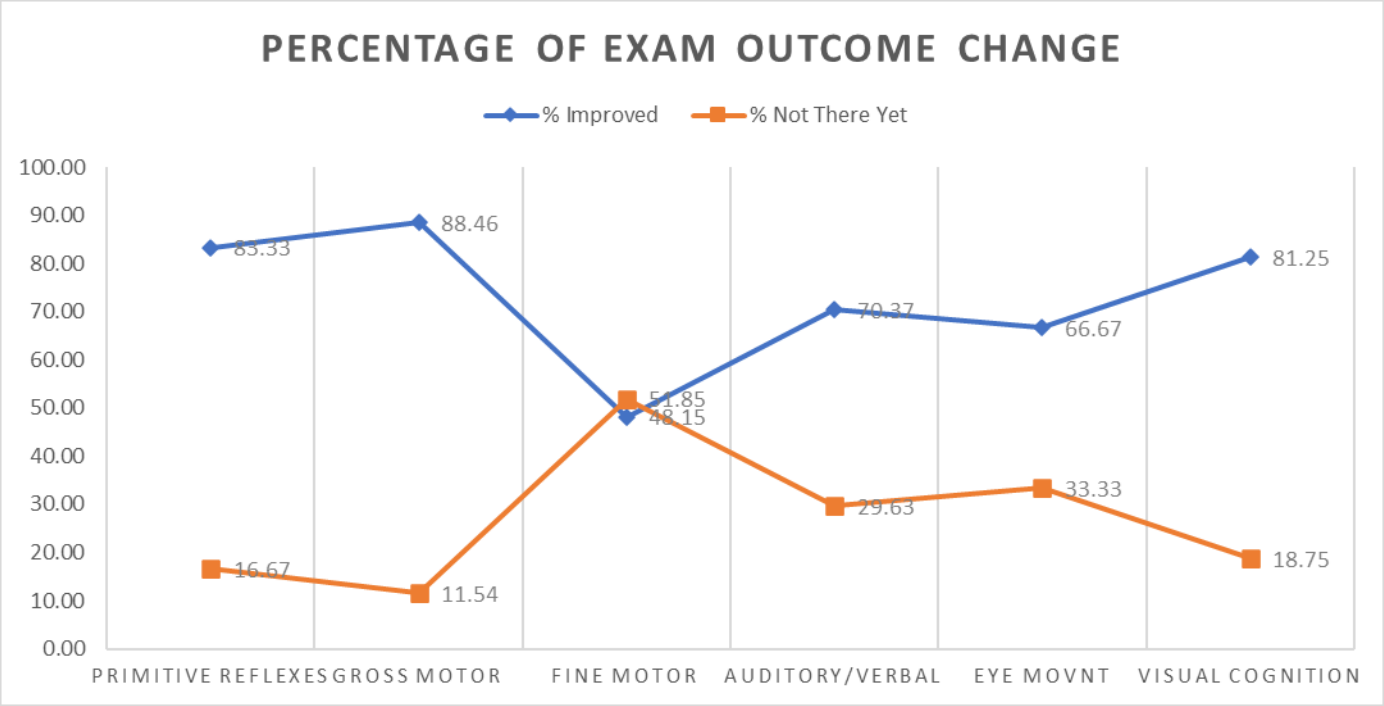

Chart 2.

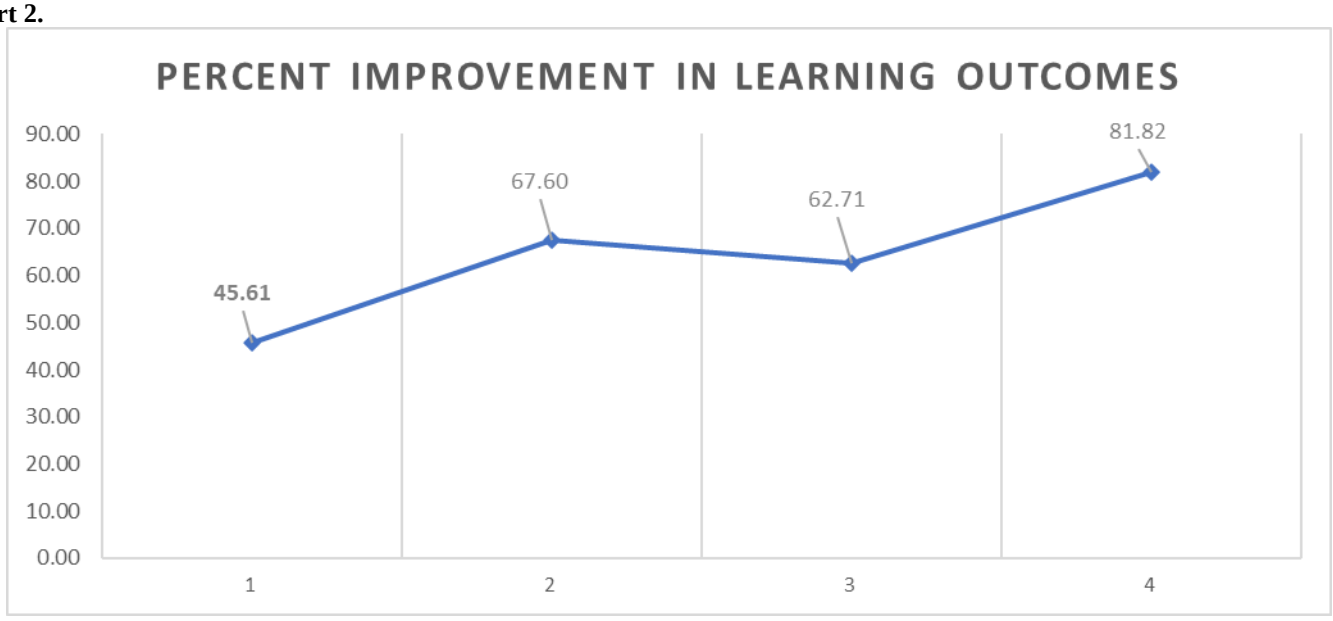

Table 1.

Parent Survey Outcomes	Total # Pt "Y"	# "B"1st/2nd/3rd/4th Re-Eval	Avg % "B" over Care Plan	Avg % "U" or "W" over Care Plan
Getting to Sleep	23	12/9/4/1	52.92	18.18
Quality of Sleep	23	9/8/6/0	57.89	29.55
Amount of Sleep	20	6/8/4/0	50.00	25.00
Limited Food Choices	21	4/8/5/2	60.95	26.19
Eating Habits	24	9/8/4/1	66.88	18.75
Digestive Health Overall	22	5/10/5/2	62.04	21.43
Frequency Of Bowel Movnts	11	2/3/2/0	31.89	27.27
Feelings about School	25	9/12/3/2	66.65	20.00
Ease with completing homework	21	10/8/3/2	77.29	14.29
Ability to concentrate on a task/goal	30	14/8/5/1	76.36	15.52
Handwriting	17	10/8/0/0	62.75	11.76
Reading comprehension	19	8/12/2/1	71.39	13.89
Organization/Planning	27	11/11/3/2	64.09	19.23
Spelling	13	3/6/0/0	42.50	29.17
Understanding Concepts	17	5/11/5/2	78.51	11.76
Vocabulary and Expression	21	11/11/4/2	70.04	14.29
Attention/Focus	28	17/17/5/1	76.72	14.81
Academic Performance/Grades	15	9/6/2/2	71.67	13.33
Participation in Extra Curr. Activities	17	8/7/3/2	70.10	17.65
Relationship with Peers	24	12/13/5/2	74.46	17.39
Sensory Sensitivity	27	16/16/7/2	83.00	14.81
Mood (Self-esteem)	33	23/20/6/2	83.41	10.94
Anxiety	31	21/18/4/2	71.88	18.33
Rigidity/Demand for Sameness	26	15/17/7/2	83.67	9.62
Sensitivity to Pain	19	8/7/2/1	43.86	21.05
Energy Level	20	8/9/2/1	48.57	22.50
Family Relationships	26	17/16/5/1	68.08	8.00
Loses Temper/Emotional Outbursts	31	22/20/4/1	63.15	16.67
Ability to Self-Regulate Emotions	32	23/18/4/2	72.95	11.29

Learning Outcomes
Intra/Interpersonal skills Outcomes
Sensory Outcomes
General Health Outcomes

Chart 3.

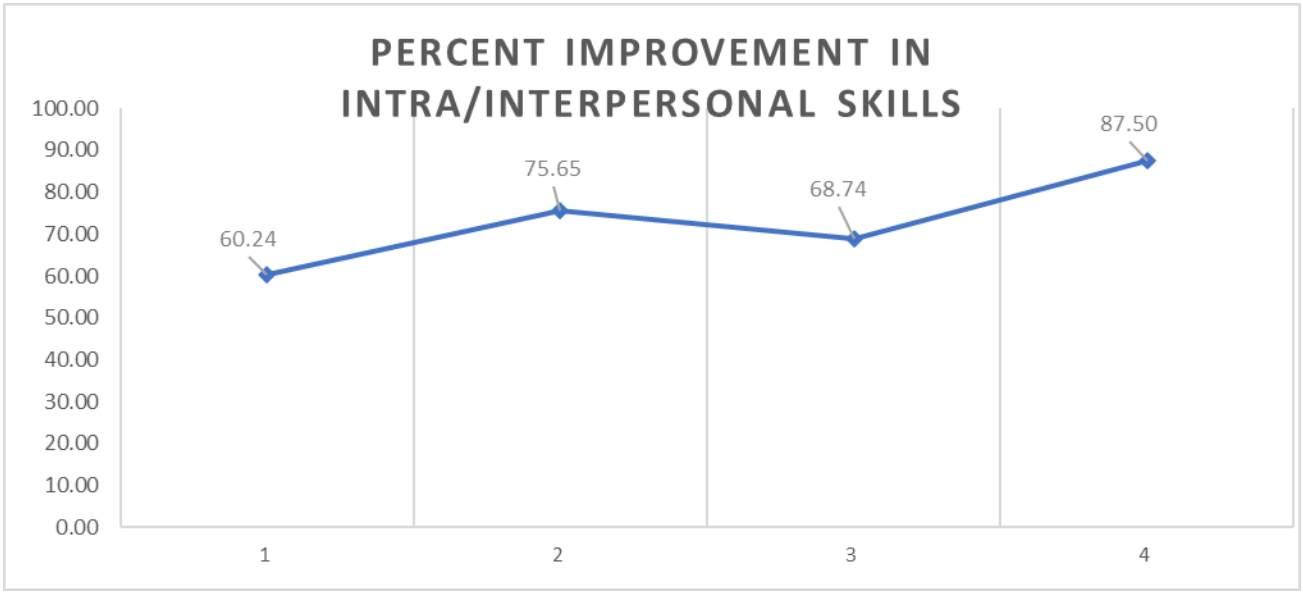

Chart 4.

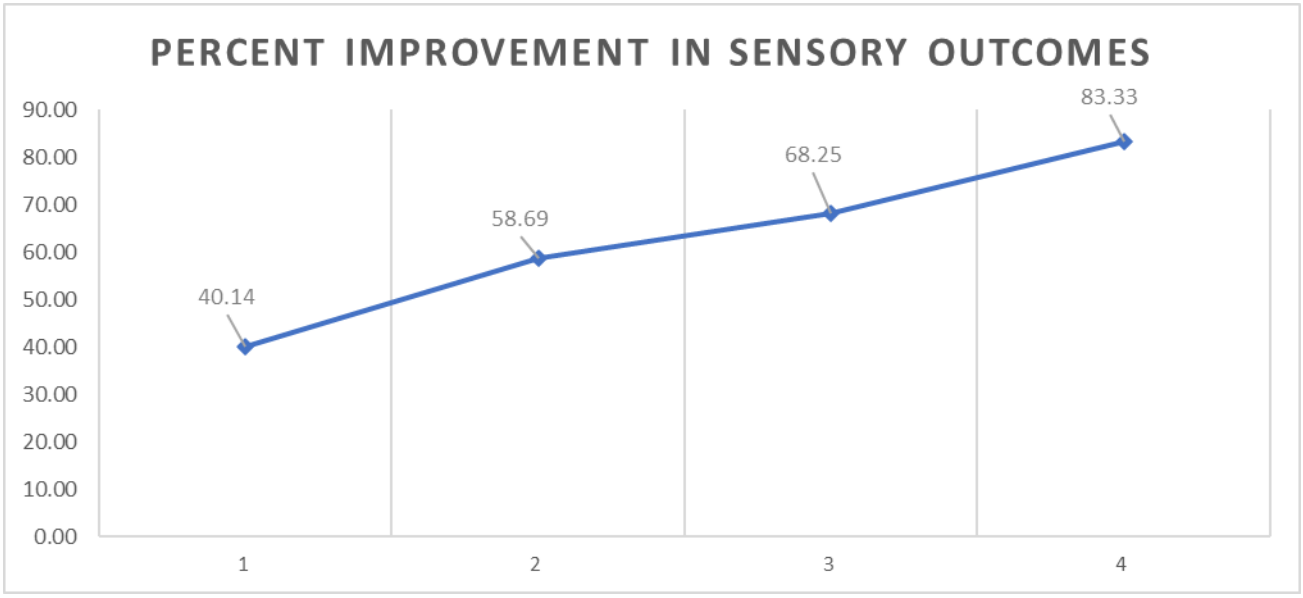

Chart 5.