Intention-Based Therapy for Autism Spectrum Disorder: Promising Results of a Wait-List Control Study in Children

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Background: Autism is a complex neurodevelopmental disability that usually manifests during the first three years of life and typically lasts throughout a person's lifetime. The purpose of this study is to investigate the efficacy of NeuroModulation Technique (NMT), a form of intention-based therapy, in improving functioning in children diagnosed with autism.

Methods: A total of 18 children who met the study criteria were selected to participate. All children completed baseline measures. The children in the experimental group ($n = 9$) received two sessions a week of NMT for six weeks. Then, children in the wait-list control group ($n = 9$) received two sessions a week of NMT for six weeks. Primary efficacy outcome measures included the Pervasive Developmental Disorder Behavioral Inventory Autism Composite Index, the Aberrant Behavior Checklist—Community Total Score, and the Autism Treatment Evaluation Checklist Total Score. Our hypotheses were that children in both groups would show significant improvement over their respective baseline scores following NMT treatment, which would reflect an improvement in adaptive behaviors as well as a decrease in maladaptive behaviors.

Results: Statistical analysis indicates a significant improvement in both the experimental and wait-list control group on all primary outcome measures following NMT treatment. The wait-list control group demonstrated no significant improvement on test measures over baseline scores during the wait period. No adverse reactions were reported.

Conclusions: These findings suggest that NMT is a promising intervention for autism that has the potential to produce a significant reduction in maladaptive behaviors and a significant increase in adaptive behaviors within a relatively short period of time.

Key words: Intention, consciousness, autism, ASD, NeuroModulation Technique, therapy, treatment

INTRODUCTION

Autism spectrum disorder (ASD) is a complex clinical syndrome that usually manifests during the first three years of life and typically lasts throughout a person's lifetime. It is characterized by restricted activities and interests, repetitive patterns of behavior, impairments in social interaction, and impairments in communication.[1] Recent advances in the genetics of autism emphasize its etiological heterogeneity, with each genetic susceptibility locus accounting for only a small fraction of cases or having only a small effect. Therefore, it is not surprising that no unifying structural or neuropathological features have been conclusively identified.[2]

Autism diagnoses have been rising steadily over the past several decades. Data from 2008 indicated an ASD prevalence of 1 in 88 children (1 in 54 boys) aged 8 years in fourteen Autism and Developmental Disabilities Monitoring Sites in the United States. This prevalence represents an estimated increase of 78% over the 2002 data[3] and a 1000% increase in the past 40 years.[4]

Lifetime cost estimates of providing care for each person with autism ranges from $1.4 to $2.3 million, depending on the level of intellectual disability present. New research estimates that autism currently costs society $126 billion per year in the United States, an amount that has more than tripled since 2006.[5] This figure is based on the 2006 Centers for Disease Control (CDC) prevalence rate of 1 in 110. These costs include treatment and medical costs throughout life, caregiver and social service costs, education costs, lost productivity of the child, lost productivity of the caregivers, and adult care.

Abbreviations: ABC-C, Aberrant Behavior Checklist, Community Version; ASD, Autism Spectrum Disorder; ATEC, Autism Treatment Evaluation Checklist; CAM, Complementary and Alternative Medicine; NMT, Neuromodulation Technique; OTC, Other-than-conscious; PDDBI, Pervasive Developmental Disorder Behavioral Inventory.

The Autism Research Institute (San Diego, CA), Steve Edelson, Ph.D., Director, provided a grant that covered a portion of the administrative costs.

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ISSN 1550-8307

http://dx.doi.org/10.1016/j.explore.2013.10.005

As increasing numbers of children are diagnosed with an autism spectrum disorder, there is a need to ensure that all of these children have access to and receive appropriate and personalized medical, educational, occupational, and social services throughout their lives. In recognition of the major challenge to public health that ASD presents, the National Institutes of Health (NIH) has been responding by supporting robust and innovative research designed to find better ways to identify, treat, and even prevent the disabling symptoms and to improve the quality of life for people with ASD and their families.[6]

There is no fully effective treatment for autism, and current therapies tend to be expensive and of long duration and may only yield slow, incremental improvement in functioning. Many children with ASD are treated with medication, but little evidence exists indicating significant benefit from most medical treatments.[7] The antipsychotics risperidone and aripiprazole have been demonstrated to reduce hyperactivity, noncompliance, and repetitive behavior, but both medications produce significant side effects including marked weight gain, sedation, and risk of extrapyramidal symptoms.[8]

Evidence is supportive of early intensive behavioral and developmental intervention (EIBI) for improving adaptive behavior, language skills, and cognitive performance in some children. EIBI is a form of applied behavior analysis treatment (ABA) that includes the University of California, Los Angeles/Lovaas model and the Early Start Denver Model. Dramatic improvements using these types of treatments were observed in a subset of children and mild improvements in terms of standardized outcomes were seen in others, but many children continued to display prominent areas of impairment. There are few or no studies that directly compare the effects of different EIBI treatment approaches and their practical utility or feasibility beyond research studies, nor is there adequate evidence to characterize the subpopulation of children who experience positive response to such interventions.[8–10]

Several types of evidence-based complementary and alternative medicine (CAM) therapies for autism have been proposed, which are primarily based on nutritional interventions, on the reduction of environmental toxins by chelation, or on mind–body therapies such as music therapy, yoga, massage, or neurofeedback.[11] Most CAM treatments have not been studied adequately and are not considered to have enough evidence to support their use.[12] While almost no research in the behavioral, educational, allied health, or CAM literature reported harms of intervention, assessment of potential harms is warranted before initiating CAM treatment,[8] especially when serious safety issues are associated with the use of that therapy, such as with the use of chelation products. The chemical substances utilized in chelation treatment have a myriad of potentially serious side effects such as fever, vomiting, hypertension, hypotension, cardiac arrhythmias, and hypocalcemia, thus presenting risks of confounding and dangerous medical conditions.[13]

Autism does not remit in the great majority of children, and the development of targeted therapies remains an important and achievable goal of current research.

In order to investigate new therapeutic approaches that may target this disorder at all of its interdependent levels—physiological, psychological, emotional, and behavioral—we conducted a therapeutic trial using a specific form of intention-based (or consciousness-based) therapy. In the context of this method, it is postulated that the mind–body represents an intelligent self-correcting system that seeks homeostasis. Any form of pathophysiology may be interpreted as a type of impaired self-awareness and a compromised ability to adapt to change in its internal and external environment. By means of focused intention/thought, the trained therapist is able to investigate the patient's subconscious informational basis and unlock the subconscious awareness of the potential for more successful regulation.[14] We show that this procedure leads to a significant and broad range of improvements in eighteen children diagnosed with an autistic disorder.

INTENTION-BASED THERAPY

NeuroModulation Technique (NMT) is based on the proposition that psychophysiological processes occurring in the patient are a reflection of the perceptual/informational state of regulatory processing systems of the mind–body. NMT postulates that the ground on which consciousness manifests itself is within a universal information field that continuously informs the mind–body, orienting it toward wellness. As an intelligent self-correcting system that seeks homeostasis, when pathophysiology occurs, it may be interpreted as some combination of diminished self-awareness and/or corruption of its informational status.[15]

NMT recognizes that the aggregate neurological and energetic components that regulate body processes function at a subconscious or other-than-conscious (OTC) level rather than at a conscious level. OTC information processing occurs at multiple levels within the central nervous system, the autonomic nervous system, biological neural networks, and energetic components that include the meridian system. NMT refers to this OTC information processing system as the Autonomic Control System (ACS).

NMT practitioners take the position that the ACS is intelligent and can comprehend meaningful dialogue that is directed to it. The practitioner investigates the ACS status by using Muscle Response Testing (MRT) to identify clinically relevant query statements/intentions structured upon a clinical topic (such as allergies or immune system functioning). MRT yields a strong or weak muscle response, which is taken by the practitioner as an affirmative or negative answer to the query. Each answer is used to help navigate through an informational decision tree that leads further in the investigation of the particular area under consideration.[14–16]

When areas of less than optimal functioning are identified, the practitioner applies a series of relevant corrective intentions designed to inform the patient that more effective ways of responding to one's internal and/or external environment are possible. These corrective intentions are taken from the NMT treatment manual, which consists of approximately 70 clinical algorithms or NMT Clinical Pathways. The ACS communication is directed to the patient by the focused

mind of the practitioner in such a way that the meaning of the communication can be immediately perceived and understood by the patient on an OTC level. This query/correction process is then repeated throughout the session. The therapeutic aim is to facilitate reorganization at the OTC level in order to produce an optimal informational state leading to more correct psychophysiology.[16]

The following is an example of a query/response sequence taken from the NMT Toxin Pathway: "Is any level of the ACS fully aware of the existence, identity, and location in the body of any of the following chemical agents bound to tissues or chemicals of the body and/or disrupting chemical or energetic signaling in the mind–body?"

MRT is then used to determine if the ACS identifies any toxin from a list of different categories of possible toxins (such as heavy metals or volatile organic compounds) as being present in the body.

When any toxins are identified, the ACS is then queried, "Is any level of the ACS fully aware of the capacity of the ACS to force a purging of these toxins from their binding sites on body tissues and chemicals, to facilitate their transport away from the tissues, and to expedite their degradation and elimination from the body?"

If a "yes" response is received to this query, the ACS is then asked to execute the therapeutic intention of the entire Toxin Pathway. MRT is used to determine if the ACS has successfully executed the therapeutic intention and started the detoxification process for the identified toxins. The query/response process may be repeated until the ACS indicates the pathway is concluded.

A similar procedure is followed for all the NMT pathways. With the NMT Allergy Pathway, for example, the ACS is queried to identify any exogenous substance or any endogenous tissue or body chemistry that is contributing to allergy, autoimmune, or inflammatory behavior. The ACS is then queried to identify all physiological processes contributing to such behavior, and then a statement is given instructing the ACS to correct the inappropriate body responses.

Each NMT pathway has a standard protocol that the NMT practitioner follows when the ACS indicates a particular pathway is needed. MRT is used to query the patient's ACS, which dictates the order in which pathways are used during a session. The sequence of pathways used during an NMT session may vary between sessions and between patients.

The MRT used in this study is a type of manual muscle testing (MMT) derived from Applied Kinesiology (AK), an evaluation and treatment method based on the discovery that the musculoskeletal system can be used as an indicator of functional neurology.[17] Since its first introduction in 1964, multiple offshoots of AK have been developed that have expanded the methodology and applications of MMT.[18–20] MMT is considered useful in the assessment of weakness of muscles directly involved with pain, injury, and neuromusculoskeletal disorders, but data is said to be lacking which demonstrates MMT's generalizability to other applications such as identification of organic disorders, or for other diagnostic purposes.[21,22] Proponents of AK argue that scientific evidence does support aspects of its scientific plausibility and validity and that criticism is often directed at studies that either omit or misinterpret essential elements of AK or have significant methodological issues in their design.[20,23]

In a previous study, the use of NMT was found to induce regression of cavitational lesions, a common progressive form of ischemic disease of the alveolar arch, with an efficacy comparable to that of surgery. Through-transmission ultrasonography and computer imaging was used to document increase in bone density in the alveolar processes of maxilla and mandible.[14] This outcome was consistent with NMT's hypothesized mechanism of change of optimizing functioning on an OTC level through the NMT dialogue process. In the cavitation study, the NMT process was said to have brought about better mind–body awareness of the jawbone cavitations, to have produced increased angiogenic activity at the osteonecrotic sites, to have produced improved immune system response to pathogens in the lesioned areas, and to have increased osteogenesis in the alveolar bone.[14] A more detailed description of the rationale and clinical algorithms underlying intention-based therapies in informational medicine are beyond the scope of this article, and more theoretical information can be found elsewhere.[14,24–30]

METHODS

Inclusion and Exclusion Criteria

The Institutional Review Board of the Pacific Graduate School of Psychology, Palo Alto, CA, approved the protocol for this study. The protocol was consistent with the Declaration of Helsinki and patients received no compensation. Male and female children between the ages of 5 and 10 years of age were recruited from 9 research sites by announcements sent to local and online autism support groups and contact with parents as well as schools and professionals who worked with children with autism.

Qualified participants were those children who had received a formal diagnosis of Autistic Disorder (299.00) from a physician or psychologist using diagnostic criteria from the *Diagnostic and Statistical Manual of Mental Disorders* (revised 4th edition).[1] Parents and/or legal guardians were required to complete an informed consent that included a videotape release. They were required to supply proof of autism diagnosis, and children were required to have had their diagnosis of autism at least one year prior to the date of the application.

Eligible children were required to have not started any new therapies or stopped any ongoing therapies designed to treat their autism such as behavior therapy, speech therapy, physical therapy, sensory integration, dietary modification or dietary supplementation, or any other alternative or experimental therapy designed to treat autism in the 6 months prior to the date of the application for participation. The purpose of this requirement was to ensure that improvement in autistic symptoms during the course of this study was not due to stopping a therapy that may have caused a worsening of symptoms in the child and to make sure that improvement seen during the course of the study was not due to a therapy that was recently started prior to receiving NMT. Also, children must not have received any previous NMT therapy.

Children diagnosed with medical conditions such as cerebral palsy, Down's syndrome, traumatic brain injury, encephalitis, Lyme disease, cancer, any active infectious disease, or any chronic medical condition other than autism (such as Crohn's disease, asthma, and bronchitis) for which the child had been receiving treatment, medication, and/or therapy were excluded from participating. Also excluded from the study were children who have had or were undergoing chelation therapy, as well as children who have displayed significant self-injurious behavior (children who have caused visible harm to themselves). Serious self-injurious behavior could create potentially confounding medical conditions such as closed head injuries or seizures, broken bones, or systemic infections from cuts. Children with a history of food or airborne allergies, sensitivities, or mild digestive problems were eligible to participate in the study.

Parents and/or legal guardians completed the Autism Treatment Evaluation Checklist (ATEC). In order to be eligible for the study, a score of 54 or higher was needed on the ATEC. Total Score on the ATEC ranges from 0 to 179. A value of 54, which fell midway between the 34th and 35th percentile on the published score distribution for the ATEC, was chosen as a cutoff to ensure that children selected to be in the study would have sufficient severity of symptoms to demonstrate treatment effects.[31] The average age of the 18 children who participated in the study was 6 years, 11 months. Seventeen children were male and one was female. Demographic breakdown of the children in the study included 11 Caucasians, 4 Hispanics, 2 African Americans, and 1 Asian. For the research sites, once a second child was recruited, the two children were assigned to either the experimental or the wait-list control group based on the home telephone number. The child with the highest last digit (or if a tie, the successive digit) of the home number was assigned to the experimental group and the other child was assigned to the wait-list control group.

The majority of children had received at least 4 different therapies such as physical therapy, occupational therapy, speech therapy, sensory integration, or behavior therapy/applied behavior analysis (ABA) before participating in the study. The range was from 0 to 9 therapies, with an average of 5.2 therapies. Only one child had never received any previous treatment for autism.

Study Design

Three outcome instruments were used to determine treatment effects: the Pervasive Developmental Disorder Behavioral Inventory (PDDBI), the Aberrant Behavior Checklist-Community (ABC-C), and the Autism Treatment Evaluation Checklist (ATEC). Primary efficacy outcome measures included mean change from start of treatment to end of treatment on the PDDBI Autism Composite Index, the ABC-C Total Score, and the ATEC Total Score. Secondary outcome measures included mean change from start to end of treatment on the remaining subscales of each of these three test instruments. Baseline measures were obtained on these instruments from parents of children in both the experimental and wait-list control groups at Week 1 of the study. The treatment schedule is illustrated in Table 1.

Table 1. Treatment Schedule

Schedule	Experimental	Wait-List Control
Week 1	PDDBI, ABC-C, ATEC	PDDBI, ABC-C, ATEC
Week 2	NMT 1, NMT 2	
Week 3	NMT 3, NMT 4	
Week 4	NMT 5, NMT 6	
Week 5	NMT 7, NMT 8	
Week 6	NMT 9, NMT 10	
Week 7	NMT 11, NMT 12	
Week 8	PDDBI, ABC-C, ATEC	PDDBI, ABC-C, ATEC
Week 9		NMT 1, NMT 2
Week 10		NMT 3, NMT 4
Week 11		NMT 5, NMT 6
Week 12		NMT 7, NMT 8
Week 13		NMT 9, NMT 10
Week 14		NMT 11, NMT 12
Week 15		PDDBI, ABC-C, ATEC

Note: PDDBI: Pervasive Developmental Disorder Behavioral Inventory; ABC-C = Aberrant Behavior Checklist, Community Version; ATEC = Autism Treatment Evaluation Checklist; NMT = NeuroModulation Technique.

For the experimental group, treatment consisting of 2 NMT sessions a week began at Week 2 and concluded at Week 7. During Week 8, one week after NMT session number 12, parents of children in the experimental group completed the final PDDBI, ABC-C, and ATEC. Also during Week 8, parents of children in the wait-list control group repeated the baseline measures on the PDDBI, ABC-C, and ATEC to determine if any positive or negative changes occurred in their children as a result of the waiting period to receive NMT treatment. For the wait-list control group, treatment consisting of 2 NMT sessions a week for 6 weeks began at Week 9 and concluded at Week 14. During Week 15, one week after NMT session number 12, parents of children in the wait-list control group completed the final PDDBI, ABC-C, and ATEC.

The average length of an NMT session in the study was 46 minutes, with a total average treatment time of 9.2 hours over 12 sessions.

Data Analyses

A repeated-measures *t*-test was used to compare treatment effects in the experimental group from start of treatment to post-treatment (Table 2), treatment effects in the wait-list control group from start of treatment to post-treatment (Table 2), and to measure any changes in the wait-list control group from baseline to start of treatment (Table 4). A two-sample *t*-test was used to determine if experimental vs. wait-list control group scores on primary outcome measures differed at the start of treatment for the respective groups (Table 3).

Statistical analyses were performed for PDDBI, ABC-C, and ATEC using the standard SAS/STAT® Software[32] and GraphPad InStat software.[33] A one-sample Kolmogorov–Smirnov (KS) test was run on each individual data set to check for normal distribution of data. In cases where one or

Table 2. Experimental and Wait-List Control Group Composite Scores on the PDDBI, ABC-C, and ATEC at the start and end of treatment

	Start of NMT (Week 1)		Post-NMT (Week 8)					
Experimental Group, $n = 9$	*M*	*SD*	*M*	*SD*	Percentage Change	*t*-Test	*p* Value	Cohen's *d*
PDDBI Autism Composite Index	63.00	15.63	48.56	15.32	−22.92	3.22	.0123	0.93
ABC-C Total Score	83.44	31.79	47.67	20.40	−42.87	4.43	.0022	1.34
ATEC Total Score	82.56	23.72	56.22	22.35	−31.90	4.33	.0025	1.14
	Start of NMT (Week 8)		Post-NMT (Week 15)					
Wait-List Control Group, $n = 9$	*M*	*SD*	*M*	*SD*	Percentage Change	*t*-Test	*p* Value	Cohen's *d*
PDDBI Autism Composite Index	52.44	7.23	41.78	10.21	−20.33	3.99	.0040	1.21
ABC-C Total Score	51.11	21.18	33.89	22.86	−33.69	3.01	.0169	0.78
ATEC Total Score	69.33	20.08	50.11	22.93	−27.72	3.54	.0077	0.89

both data sets in a comparison did not pass the individual KS test for normality, a two-sample KS test was run, and for every two-sample KS test that was performed, there was no evidence to support the hypothesis that the two samples came from different populations. A $p < .05$ (two-tailed) was considered significant for all analyses.

OUTCOME MEASURES

PDDBI

Diagnostic tools for assessing autism such as the Autism Diagnostic Interview-Revised (ADI-R)[34] and the Autism Diagnostic Observation Schedule (ADOS)[35] have limitations in that these instruments were not designed to assess response to treatment, and the scales do not yield age-standardized scores that were derived from a normative sample.[36] Other scales have been used in research studies to measure responsiveness to treatment including the Childhood Autism Rating Scale (CARS)[37] and the Autism Behavior Checklist (ABC),[38] but these rating instruments lack information regarding adaptive behaviors and only assess problem behaviors. A treatment for autism (i.e., pharmacological) that suppresses maladaptive behaviors such as hyperactivity or aggression may be reported as efficacious, but the intervention being studied also may suppress adaptive behaviors such as social communication. If test instruments that detect such effects are not used, faulty conclusions about the true efficacy of the intervention may be derived.[36]

The Pervasive Developmental Disorder Behavioral Inventory (PDDBI) was developed specifically to address these limitations with existing autism instruments.[36] The PDDBI assesses response to intervention and includes assessment of social communication behaviors with age-standardized scoring that is sensitive to developmental change in children with autism. The PDDBI was standardized on a well-diagnosed sample and provides a standard T score on each scale of the PDDBI (mean of 50 and a standard deviation of 10) that measures deviance from the average score shown by a typical person with autism. A T score of 50 in all domains is typical of a child with autism of a given age. All items on the PDDBI are completed on a 4-point Likert scale ranging from 0 (does not show behavior) to 3 (usually/typically shows behavior). The PDDBI is published in both a Parent and a Teacher Rating Form. The Parent Rating Form was used in this study.

The PDDBI measures 10 domains including 7 Approach-Withdrawal Problem areas for which higher T scores indicate increasing level of severity and 3 Receptive/Expressive Communication Skill areas for which higher T scores indicate increasing competence.

The Approach-Withdrawal Problem areas on the PDDBI include the following domains: Sensory/Perceptual Approach Behaviors (SENSORY), Ritualisms/Resistance to Change (RITUAL), Social Pragmatic Problems (SOCPP), Semantic Pragmatic Problems (SEMPP), Arousal Regulation Problems (AROUSE), Specific Fears (FEARS), and Aggressiveness (AGG). The Receptive/Expressive Social Communication Abilities domains include Social Approach Behaviors (SOCAPP), Expressive Language (EXPRESS), and Learning, Memory, and Receptive Language (LMRL).

Table 3. Experimental vs. Wait-List Control Group Composite Score differences on the PDDBI, ABC-C, and ATEC at the start of treatment

	Experimental Start of NMT (Week 1)		Wait-List Control Start of NMT (Week 8)		Difference			
Outcome Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*	*t*-Test	*p* Value
PDDBI Autism Composite Index	63.00	15.63	52.44	7.23	10.56	12.18	1.84	0.0846
ABC-C Total Score	83.44	31.79	51.11	21.18	32.33	27.01	2.54	0.0219
ATEC Total Score	82.56	23.72	69.33	20.08	13.22	21.98	1.28	0.2201

Table 4. Wait-List Control Group Composite Score change on the PDDBI, ABC-C, and ATEC from baseline to start of treatment

	Baseline (Week 1)		Start of NMT (Week 8)				
Wait-List Control Group	*M*	*SD*	*M*	*SD*	Percentage Change	*t*-Test	*p* Value
PDDBI Autism Composite Index	51.11	9.02	52.44	7.23	+2.60	−0.73	0.4843
ABC-C Total Score	47.33	22.44	51.11	21.18	+7.99	−1.64	0.1394
ATEC Total Score	68.44	18.85	69.33	20.08	+1.30	−0.27	0.7914

The PDDBI has 5 Composite Score indices: 2 for the Approach-Withdrawal Problem areas for which higher T scores indicate increasing level of severity (Repetitive, Ritualistic & Pragmatic Problem Behaviors Composite—REPRIT/C and the Approach-Withdrawal Problems Composite—AWP/C); 2 for the Receptive/Expressive Communication Abilities areas for which higher T scores indicate increasing competence (Expressive Social Communication Abilities Composite —EXSCA/C and the Receptive/Expressive Social Communication Abilities Composite —REXSCA/C); and an Autism Composite (AUTISM) which is comprised of the formula (SENSORY + RITUAL + SOCPP + SEMPP)—(SOCAPP + EXPRESS). Higher T scores on the Autism Composite indicate increasing level of severity.

The PDDBI has been shown to have very good internal consistency, developmental validity, and construct validity. The PDDBI Parent Autism Score was significantly correlated with the Childhood Autism Rating Scale (CARS) ($r = 0.53$, $p < .0001$) and all behavioral measures of the Autism Diagnostic Interview-Revised (ADI-R) Qualitative Impairments in Reciprocal Social Interaction (QIRSI), $r = 0.58$, $p < .001$; Communication (COM) $r = 0.40$, $p < .001$; and Repetitive Behaviors and Stereotyped Patterns (RSP), $r = 0.35$, $p < .01$). Maladaptive scales from the Parent PDDBI correlated well with comparable factors of the Nisonger Child Behavior Rating Form (CBRF). For example, the PDDBI Sensory/Perceptual Approach Behaviors subscale was correlated most strongly with the Self-Injury/Stereotypic ($r = 0.60$, $p < .0001$) and Hyperactive CBRF factors ($r = 0.57$, $p < .0001$).[39,40]

Adaptive sections of the Parent PDDBI correlated highly with direct assessments of a child's intellectual functioning on the Griffiths Mental Development Scales (GMDS), with the PDDBI language scales correlating most strongly with the GMDS General Quotient (GQ) (PDDBI Social Approach Behaviors, $r = 0.61$, $p < .0001$; PDDBI Learning, Memory. and Receptive Language, $r = 0.74$, $p < .0001$). All of the adaptive subscales on the Parent PDDBI correlated with the Vineland Adaptive Behavior Scales (VABS), with the strongest correlations between comparable scales. For example, the Vineland Communication Scale (CSS) correlated most strongly with the language subscales on the PDDBI (Semantic/Pragmatic, $r = 0.81$, $p < .0001$ and Learning, Memory. and Receptive Language, $r = 0.76$, $p < .0001$).[39,40]

ABC-C

The aberrant behavior checklist (ABC) was originally designed to monitor the effects of psychotropic drugs on the maladaptive behavior of mentally retarded individuals in residential treatment settings.[41] This inventory consists of 58 items that address five dimensions of inappropriate and maladaptive behavior. These five factors have been confirmed in several studies.[42,43] The dimensions of inappropriate and maladaptive behavior measured by the ABC are as follows: Irritability (15 items), Lethargy (16 items), Stereotypy (7 items), Hyperactivity (16 items), and Inappropriate Speech (4 items). Behaviors are rated on a 4-point scale from 0 to 3, with higher scores indicating more severity of the behavior specified.

In 1994, the authors of the ABC published the ABC-C, a slightly modified version of the ABC with wording that reflected community settings rather than institutional settings.[44] The revision allowed the ABC to be used in research in a variety of settings. The ABC-C uses the same five dimensions to rate behavior as the ABC, and it was found to have the same psychometric properties as the original version.[45] Over 100 studies have used the ABC for measuring treatment outcomes with pervasive developmental disorders and with children and adults with intellectual disability. The ABC is considered to be remarkably sensitive to treatment effects.[46,47]

ATEC

The Autism Treatment Evaluation Checklist (ATEC) was developed by Rimland and Edelson[48] and was designed specifically to assist researchers, practitioners, and parents in evaluating the efficacy of any type of treatment used to treat autism. The authors realized that most instruments that were being used in autism research studies were developed to diagnose autism and were not intended to measure gradations of improvement. The use of such instruments in treatment outcomes studies could overlook subtle changes, and as a consequence lead to inconclusive or misleading results.[49]

The ATEC consists of 4 scales and a total score based on the total of all 4 scales: (I) Speech/Language/Communication (14 items, score range 0–28), (II) Sociability (20 items, score range 0–40), (III) Sensory/Cognitive Awareness (18 items, score range 0–36), and (IV) Health/Physical/Behavior (25 items, score range 0–75). The higher the score on each scale, the more impairment is present in that area. The Total Score for all 77 items can range from 0 to 179. A decline in scale scores indicates improvement in that area. Split-half reliability test analyses on 1358 completed ATECs indicated high internal consistency reliabilities of both the scales and Total ATEC score ranging from 81 to 94.[31]

RESULTS

Primary Measures

Test data validated the hypotheses that children in the experimental group would show significant improvement as measured by the PDDBI Autism Composite Index, ABC-C Total Score, and the ATEC Total Score as a result of receiving

12 sessions of NMT, that the wait-list control group would show no significant improvement on these measures during the wait period, and that the wait-list control group would show significant improvement on these measures as a result of receiving 12 sessions of NMT.

The experimental group showed significant improvement on all 3 primary outcome measures (PDDBI Autism Index, $p = .0123$; ABC-C Total Score, $p = .0022$; and ATEC Total Score, $p = .0025$) (Table 2).

At the start of treatment for each group (Week 1 experimental and Week 8 wait-list control), there was no difference between groups on the PPDBI Autism Index and the ATEC Total Score. The experimental group did have a higher score on the ABC-C Total Score, $p = .0219$ (Table 3).

As expected, the wait-list control group showed no significant improvement on any of the primary measures as a result of the eight week wait prior to receiving treatment (Table 4).

After receiving treatment, the wait-list control group showed significant improvement on all 3 primary outcome measures (PDDBI Autism Index, $p = .0040$; ABC-C Total Score, $p = .0169$; and ATEC Total Score, $p = .0077$) (Table 2).

Overall robust outcome measures and effect sizes were obtained on all primary measures (Table 2).

Secondary Measures

With regard to the secondary outcome measures, statistically significant improvement was seen in the experimental group on 11 of 14 subscales of the PDDBI, 4 of 5 subscales of the ABC-C, and all 4 subscales of the ATEC from pre-NMT (Week 1) to post-NMT (Week 8). Experimental group secondary outcomes are summarized below and in Figures 1–3.

Readers who are interested in a greater degree of detail on the secondary outcome measures may contact the senior author (RW).

As expected, the wait-list control group showed no significant improvement on any of the secondary outcome measures as a result of the eight week wait prior to receiving treatment. Values on one subscale (Irritability) of the ABC-C showed a significant worsening ($p = .0384$) as a result of the wait.

Following treatment, statistically significant improvement was seen on 6 of 14 subscales of the PDDBI, 4 of 5 subscales of the ABC-C, and 3 of 4 subscales of the ATEC from start of treatment (Week 8) to post-NMT (Week 15). Wait-list Control group secondary outcomes for each test instrument are summarized below and in Figures 1–3.

PDDBI

Significant improvements in the following PDDBI subscales were observed in the experimental group following treatment: SENSORY ($p = .0213$), RITUAL ($p = .0050$), AROUSE ($p = .0498$), FEARS ($p = .0156$), SOCAPP ($p = .0270$), EXPRESS ($p = .0406$), LMRL ($p = .0021$), REPRIT/C ($p = .0151$), AWP/C ($p = .0130$), EXCA/C ($p = .0123$), and REXSCA/C ($p = .0123$) (Figure 1).

Significant improvements in the following PDDBI subscales were observed in the wait-list control group following treatment: RITUAL ($p = .0221$), SOCPP ($p = .0146$), SEMPP ($p = .0072$), FEARS ($p = .0342$), REPRIT/C ($p = .0096$), and AWP/C ($p = .0206$) (Figure 1).

ABC-C

Significant improvements in the following ABC-C subscales were observed in the experimental group following treatment: Irritability ($p = .0014$), Lethargy ($p = .0016$), Stereotypy ($p = .0175$), and Hyperactivity ($p = .0164$) (Figure 2).

Significant improvements in the following ABC-C subscales were observed in the wait-list control group following treatment: Irritability ($p = .0217$), Lethargy ($p = .0294$), Stereotypy ($p = .0101$), and Inappropriate Speech ($p = .0092$) (Figure 2).

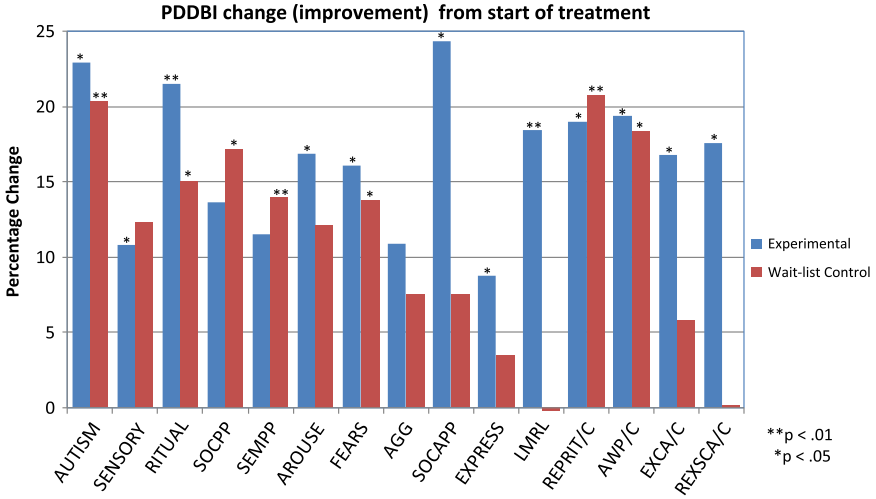

Figure 1. Percentage change (improvement) on the PDDBI Autism Composite and PDDBI subscales from start to end of treatment for the Experimental and Wait-List Control groups.

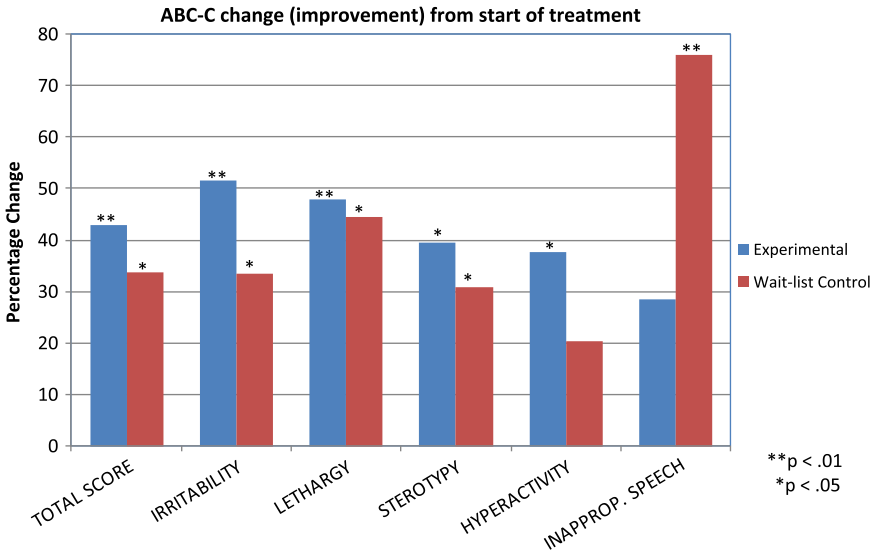

Figure 2. Percentage change (improvement) on the ABC-C Total Score and ABC-C subscales from start to end of treatment for the Experimental and Wait-List Control groups.

ATEC

Improvements in the following ATEC subscales were observed in the experimental group following treatment: Speech/language/communication ($p = .0072$), Sociability ($p = .0315$), Sensory/cognitive awareness ($p = .0351$), and Health/physical/behavior ($p = .0001$) (Figure 3).

Improvements in the following ATEC subscales were observed in the wait-list control group following treatment: Sociability ($p = .0133$), Sensory/cognitive awareness ($p = .0111$), and Health/physical/behavior ($p = .0211$) (Figure 3).

DISCUSSION

Children in both treatment groups responded very well to NMT with significant improvement in all primary outcome measures and a majority of the secondary measures. Not only were maladaptive behaviors such as irritability and hyperactivity reduced but improvements were seen in adaptive behaviors such as social approach behavior and expressive language.

At the start of treatment, the experimental group had a trend toward worse scores on all primary outcome measures as well as on all secondary outcome measures than the wait-list control group (non-significant on all measures except on the ABC-C Total Score, $p = .0219$; ABC-C Stereotypy subscale, $p = .0318$; and the ABC-C Hyperactivity subscale, $p = .0141$). This suggests that the experimental group as a whole may have had slightly more severe autism symptoms than the wait-list control group did before treatment began. On the PDDBI, at the start of treatment, the experimental group not

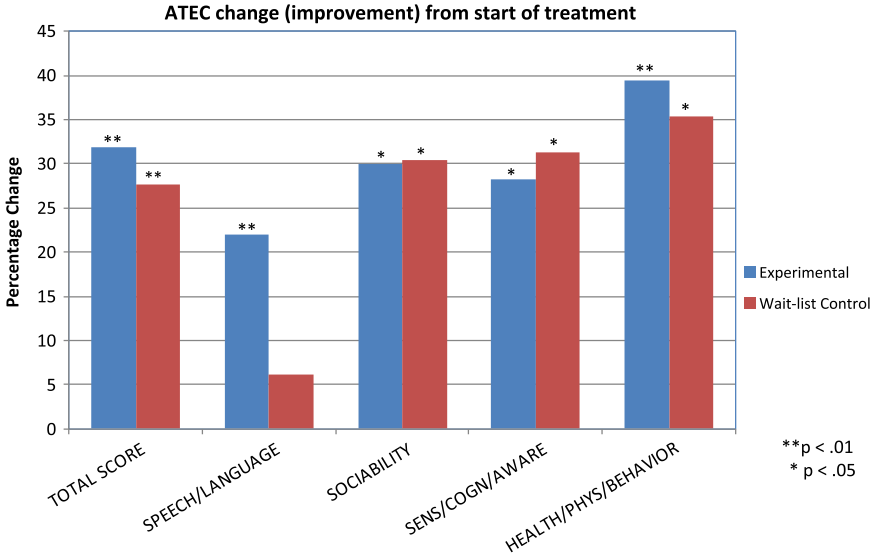

Figure 3. Percentage change (improvement) on the ATEC Total Score and ATEC subscales from start to end of treatment for the Experimental and Wait-List Control groups.

only had higher scores than the wait-list control group did on all subscales reflecting maladaptive behavior (reflecting more severe symptoms) but it also had lower scores than the wait-list control group did on all subscales reflecting adaptive behavior (reflecting less adaptive behavior present). The experimental group showed significant improvement on all 5 of the adaptive subscales of the PDDBI following treatment, whereas the wait-list control group did not significantly improve on any of these adaptive measures. The reason for this difference may have been that the wait-list control group was already functioning at a higher level in these areas to start with, thereby leaving the experimental group with more room for improvement.

An overall reduction in autism symptoms generally was reflected by significant decreases in the PDDBI Autism Composite Index in both the experimental ($p = .0123$) and wait-list control groups ($p = .0040$), as well as significant decreases on the ATEC Total Score, an index specifically designed to measure autism treatment effects ($p = .0025$ for the experimental group and $p = .0077$ for the wait-list control group).

NMT does not address specific behaviors or diagnostic classifications per se for correction or change but rather seeks to improve overall internal organization so that changes in speech, language, behavior, response to the environment, and physiological functioning occur naturally. Treatment priority is determined by the patient's need (as indicated by the response to the MRT inquiries) and not by a pre-set treatment plan. NMT does not suppress adaptive behaviors, something that may occur with use of medications, which may have sedating side effects.

NMT is easy to administer and imposes very little demand on both the child and the therapist. NMT is a self-contained treatment that can be administered to a child of any age. No electrodes, wires, electronic devices, etc. are required to administer it. At the same time, this treatment can complement and is compatible with all other forms of treatment a child may be concurrently receiving. Children who receive NMT tend not to view participating in a session as work or a chore, as they are free to participate in a favorite behavior of their choice during a session such as reading, playing video games, or watching a DVD.

NMT differs from intention-based interventions that rely on unidirectional intention such as prayers for healing of a specific medical condition or prayers that simply seek recovery when the medical condition is unknown or unspecified. NMT is a true collaborative process where the patient essentially directs the order of treatment through the MRT process of therapist ↔ patient communication on an OTC level.

A traditional behavioral treatment for autism such as EIBI is also a collaborative process between the therapist and child, but such treatments require some degree of conscious cooperation and attention from the child, and the course of treatment progress can be painstakingly slow at times. Since NMT is based on OTC communication between the therapist and recipient, the attention or even the cooperation of the child is neither required nor necessary for NMT to be effective. This aspect of NMT enhances its efficacy because a treatment can proceed without delay or loss of effectiveness even if a child is in an uncooperative or defiant mood.

While specific clinical pathways (query and correction statements/intentions structured on different clinical topics) are used in an NMT treatment session, no standardized session plans are used with NMT. The pathways used within a session and the order of use of each pathway generally change from session to session because the overall status of the patient changes with each query and correction performed. The patient presents with a constantly updating status, and the MRT process used to determine the next treatment pathway within a session is based in real time on the most current status, not just the status of the patient when he or she started the treatment session.

Implicit in the practice of NMT is the assumption that therapeutic intention can be communicated on an OTC basis, independent of the state of consciousness or cooperation of the recipient. The ability of NMT to effectively bypass the conscious minds of these children and direct a dialogue with their OTC minds appears to account for the significant treatment gains seen in a relatively short amount of treatment time (an average total length of treatment of only 9.2 hours). This type of intention-based treatment facilitated communication within each child at a subconscious/OTC level in order to produce more successful self-regulation, which in turn led to a reduction in autism symptoms.

Follow-up NMT studies with this population should include larger group sizes, use of third-party non-family evaluators such as teachers, tutors, or therapists to provide potentially more accurate ratings of change in different environments, a longer period of treatment, additional follow-up ratings to measure the persistence of observed changes, and a placebo treatment group.

CONCLUSION

The results from this preliminary study using NMT to ameliorate symptoms of autism are very encouraging. This study provides a foundation for future investigations on the use of NMT as well as other intention-based interventions as a treatment for complex neurodevelopmental disorders.

Acknowledgments

We would like to express our gratitude to the families and children who participated in this study, as well as to the NMT practitioners who collected the data: Fred Bloem, MD; Monica Cristobal, RD, MS; Christine Hannafin, PhD; Robert I. Jeffrey, DC, LAc; Taras Lumiere, DC, LAc; Lisa Rhodes, DPM, LAc; Lorena Rosas, RD; Rick Schwartz, DC; and Robert Weiner, PhD. Leslie Feinberg, DC helped with the recruiting of researchers for the study. We would also like to thank Donna Jackson-Maldonado, PhD, Universidad Autónoma de Querétar; Angel's Purse, Inc.; Raquel Solvey, MD; and Lorena Rosas, ND for translations. Riccardo Cassiani-Ingoni, PhD assisted with the manuscript preparation. All the researchers in this study donated their time and services for data collection.

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