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OUTCOMES OF A PILOT TRAINING PROGRAM IN A QIGONG MASSAGE  
INTERVENTION FOR YOUNG CHILDREN WITH AUTISM

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### Abstract

Sensory impairment is a common and significant feature of children on the autism spectrum. In 2005, a qigong massage intervention based on Chinese Medicine, and delivered by a physician trained in Chinese medicine, was shown to provide short-term improvement of sensory impairment and adaptive behavior in a randomized control study with a small sample of young children with autism. The intervention was two-pronged, involving both direct treatment of the child as well as parent training in a follow-through massage. In 2006, the methodology was adapted, and the Qigong Sensory Training (QST) program was developed with the aim of providing Western-trained occupational therapists and early intervention specialists sufficient theory and skills in Chinese Medicine and qigong massage to achieve proficiency in providing the intervention. This article describes the preliminary evaluation of the Qigong Sensory Training (QST) program as piloted with 15 professionals, 26 children and outcome testing using standardized tests of sensory impairment and adaptive behavior. Results of outcomes comparing delivery by QST trained therapists with delivery by a physician trained in Chinese Medicine showed that both groups receiving the intervention improved, and there was no difference in outcome between the two groups. A description of the intervention and training program is provided. Implications for further research are discussed.

## Introduction

Current clinical research describes the widespread presence of sensory impairment in children with autism (Baranek, 1999; Dawson & Watling, 2000). This sensory impairment takes the form of over- or under-reacting to visual, auditory, touch, pain and oral stimuli rather than abnormalities in hearing or vision tests. Many different patterns of sensory reactivity have been documented (Dunn, 2006) such that children can be over-reactive, under-reactive, or have mixed reactivity with some of the senses responding normally. It is not known what causes the sensory impairment or whether it causes the delayed social and language learning seen in autism, but clinical research has correlated sensory impairment with each item in the diagnostic criteria, indicating that sensory impairment can impact the core deficits in autism (Dawson & Lewy, 1989; Baranek, Foster, & Berkson, 1997; Rogers, Hepburn, & Wehner, 2003).

In a related parallel, blind and deaf children also manifest repetitive behaviors and difficulty in learning language and social skills until their sensory impairment is accommodated or treated (Carville, 2001). The impairment is usually diagnosed within the first year of life, at which point intervention is directed at the specific hearing or visual deficit. For children with autism, however, diagnosis occurs much later, often not until the third year of life when the child is further behind developmentally, and while there are effective aids to communication (Frost & Bondy, 1994), a specific intervention directed at correcting the specific sensory abnormalities of each child is not available. The most recent review of all therapies for the sensory impairment of autism indicates that in the critical years when early intervention is helpful, there is no widely recognized, effective and definitive treatment for the sensory impairment (Baranek, 2002).

### **Chinese Medicine and Qigong Massage**

With the current openness in the West to treatments used in the East, and in search of

gentle, non-invasive treatment approaches for young children with autism, the question was asked “What does Chinese Medicine have to offer for sensory impairment and autism?” This article describes the third research study of an intervention for sensory impairment from a branch of Chinese Medicine known as qigong massage. Qigong, pronounced “chee-gong” refers to the skill of using specific manual techniques to work with energy according to a Chinese medicine concept of energy and energy channels (Yang, 2005).

All of Chinese medicine, including acupuncture and massage, is based on an understanding of the body that is quite different from that in the West. Both illness and health are understood in terms of the flow of energy or “qi” through the network of energy channels (meridians) that comprise the bioelectric field permeating the body. Over the millennia, effective treatment of illness has been developed using this energetic model and westerners are often surprised to learn that in China, a wide variety of children’s illnesses, ranging from constipation to asthma, are treated non-invasively with massage (Chengnan, 1990). Compared to the length of time that Chinese Medicine has been practiced, the Western scientific exploration of the mechanisms by which treatments have their effect is in its relative infancy. Current Western research on the mechanism of action of treatment of the energy channels and acupuncture points indicates that the effects of treatment are mediated by the neurotransmitters (Stux & Hammerschlag, 2001). Research evaluating the effect of treatment on acupuncture points on the extremities with PET scans of the brain shows that stimulation of points on the skin results in complex connecting patterns of neuronal firing in the brain (Biella, Sotgiu, Pellegata, Paulesu, Castiglioni & Fazio, 2001). The expanding envelope of knowledge resulting from Western scientific research is often uneven, and while the research on the full elucidation of *how* Chinese medicine works is still early, numerous studies have been published over the past three decades

indicating that it *does* work for a multitude of illnesses: these scientific studies measure results before and after treatment according to the current standards of quality research: controlled studies, standardized testing and blinded examiners (Kaptchuk, 2002).

Qigong massage is different from ordinary massage in that it is based on understanding the channels and points and the flow of energy through them (see Williams, 1996 for illustrations and further explanation of the channels,). Practitioners of qigong massage themselves learn and practice daily qigong exercises in order to build their health and awareness of energy. It is understood that qigong treatment demands energy of the practitioner, and that in order to treat patients who are ill, they should be healthy and have abundant energy. Prior to beginning treatment, the practitioner centers him or herself using a qigong exercise. Specific manual techniques are then used taking into consideration the direction of flow in the channels, and the location of important acupuncture points on the head, hands and feet. The weight and speed of the manual technique are matched to the individual child according to concepts from Chinese Medicine such as toxicity, deficiency and block. The parent massage is very important as parent touch is considered by Chinese Medicine to be the most nurturing for the child by virtue of the parent-child bond.

### **Previous Research on Qigong Massage**

In 2005, a small randomized control study was completed testing the effectiveness of a specific qigong massage intervention on sensory impairment and social development in young children with autism (Silva, Cignolini, Warren, Skowron-Gooch, & Budden, 2007). According to a very ancient idea in Chinese medicine, the senses are considered to be the doors and windows upon the world: the way by which the child's awareness can move between their inner world and the outer world. In autism these doors are considered partially closed, such that the

child lives more in their inner world and is less aware of the world around them. Since social learning requires that children be aware of their social environment, sensory impairment interferes with a key foundation of the learning process. The premise of our research links the child's delay in social development to their sensory impairment and then evaluates the outcome of an intervention designed to improve the sensory impairment on social learning (Silva & Cignolini, 2005).

In the 2005 study the intervention was delivered by a physician trained in Chinese Medicine. Thirteen children with autism from three to six years of age were randomly assigned to a treatment or a wait-list control group. Both groups of children were enrolled in early intervention services that included occupational therapy and speech therapy. All children were pre- and post-tested with standardized measures of sensory impairment and adaptive behavior. At the end of five months, treated children showed decreased sensory impairment and improved adaptive behaviors compared to the children in the control group. In addition, all children with bowel and sleep problems improved as measured by parent questionnaires (Silva et al., 2007).

### **Current Study**

The authors found the results of this small study promising, and warranting replication and extension with a larger number of trainers and children. Consideration was given to what would be necessary in a training program for trainers, and the most suitable educational background for trainers. The current study was designed to determine if similar improvements in children would occur when Western-trained individuals completed a training and skill-development program to deliver this intervention. The 80-hour Qigong Sensory Training (QST) program was piloted and tested with 15 trainers working with 26 children with autism and their parents. The research questions were: 1. Do the children receiving the qigong massage by trained therapists, and

parents trained by these therapists, exhibit positive gains in adaptive behaviors and amelioration of sensory impairments?

2. Do Occupational Therapists and other EI/ECSE personnel demonstrate proficiency in providing the intervention after completion of the QST training program?

3. If children do exhibit positive outcomes, are these outcomes equivalent to those experienced by children who received the qigong massage treatment from a Chinese Medicine trained professional in a previous randomized control study?

A pre-post single group design was employed to address question one. Question two was answered by evaluation of the trainers during supervision according to set criteria. To answer question three, a pre-post comparison group design was employed for difference and equivalence testing (Schuimann, 1981, 1987) employing results from the 2005 experimental treatment group.

## Method

### Participants

Selection of QST Trainers. Three pre-requisites for training were identified: 1) trainers should have a minimum of three years of experience working with children with autism in order to allow them the skills necessary to engage the child in the qigong massage and establish a working relationship with the parent, and 2) trainers should be healthy and energetic by their own assessment, and not on medication for chronic health conditions. Invitations to potential trainers were extended to professionals working at the local Education Service District (ESD) as well as health professionals working in the local community. Efforts were made to recruit primarily occupational therapists and individuals working in early intervention programs with children who have autism because the ESD collaborating with this research wanted to begin offering QST through their occupational therapists.

Because not enough individuals from these two fields applied for the training, six of 18 trainers recruited included a chiropractor, a social worker, two medical qigong practitioners, a nurse, and a retired educator. All but the two qigong medical practitioners had extensive experience with young children.

Selection of Children and Parents. Children were selected from an Education Service District covering three adjacent counties in Oregon. An invitation letter was sent out to parents of all children between three and six years of age receiving autism services from the ESD. Eligibility criteria were established for selection of the children and their parents. Criteria for selection of children to receive QST were: 1) under six years of age with a diagnosis of autism at the onset of the study, 2) enrolled in early intervention services and 3) without additional complicating medical diagnoses or medication such as chelating agents. Parents agreed to transport their children 21 times to the clinic to receive the training and treatment and not to begin additional interventions for autism during the study. Of the respondents, 26 children met the eligibility criteria, completed the full protocol and are included in the final data analysis.

### QST Program

The QST program included a well-developed curriculum, training procedures and supervision intended to bring therapists and parents to a specified level of proficiency.

QST Curriculum and Training Procedures for Trainers. A skill-based curriculum in applied Chinese science relative to autism was designed: program learning objectives were established and 50 hours of didactic and experiential material were created for trainers to develop the necessary skills and understanding to lead the treatment process and train the parents. Trainers were expected to master a theoretical and practical understanding of the child with autism according to concepts important to Chinese science: yin, yang, qi (energy flow),

channels, toxicity, block, and deficiency (Yanchi, 1988). After mastering the 12 treatment movements, they were trained to recognize different patterns in autism and to modify their touch to fit the pattern of the individual child (for example, they might adjust the weight and speed of the hand to the mass of the child or change the direction of the massage movement as the bowel patterns return to normal). There were an initial six days of didactic and experiential training during which time trainers were evaluated with daily written quizzes and a final written and practical examination. This was followed by a five-month period of supervision and an additional 12 hours of didactic training to understand and support the stages of the healing process seen with this intervention.

Supervision of QST trainers. As part of their training, each trainer delivered the five-month intervention to two children and their families under the supervision of the principal investigator. The supervisor was present in the room for seven of each child's sessions to evaluate the level and fidelity of the intervention and support the learning of the trainer. She provided feedback to the trainer after each session, and throughout the five months, was readily available for consultation on any problems encountered in the sessions.

Use of Video. Seven of the 20 sessions for each child were videoed and edited as a teaching presentation of the progress of each of the 26 children. This was shown to the trainers at the mid and end-point of treatment to allow for further skill-development. Upon completion of the five-month training, each trainer would have, not only in-depth experience with their own two children and families, but also substantial understanding of the process for the larger group.

The Qigong Massage Protocol. The qigong massage itself consists of a fifteen-minute series of gentle patting massage movements that take place along Chinese energy channels related to the proper functioning of sensory and physiological systems. It is designed to relax the

child, normalize the reactivity of the senses and have restorative effects on digestion and sleep. The trainer leads the intervention with a bi-weekly individualized version of the massage protocol that advances the progress of the child and parents follow with a daily nurturing and calming massage treatment; both are essential to the effectiveness of the program.

The massage protocol used consisted of the 11 movements used in the previous study (Silva et al., 2007) plus one. Because of the large number of children with a history of recurrent ear infections and severe receptive language deficits, a 12<sup>th</sup> movement was added to help address the functional impairment to hearing. The actions of the twelve movements according to Chinese meridian theory are briefly described below:

Movements 1, 2, 3: clear the senses and open the brain to incoming sensory information.

Movement 3A: clear additional functional impediments of the ear to hearing in cases of severe receptive language delay and history of recurrent ear infection.

Movements 4, 5: promote social interaction and speech.

Movements 6, 7, 8: strengthen overall health, digestion and elimination.

Movements 9, 10, 11: calm and quiet the child, improve sleep, nourish the brain.

Training curriculum for parents. An important feature of this intervention is the strong parent training and support component. Over a period of five months, the trainer meets with the parents and child 21 times, providing the parent with a total of eleven hours of training in the daily follow-through massage utilizing the 12-part protocol above. Each training session lasts about 30 minutes. Because of the range of educational and philosophical backgrounds in parents, it was elected *not* to use the language of Chinese medicine in teaching the parents to do the massage, but rather to focus on the mechanical aspects of how it is done, the importance of integrating it into the child's daily routine, and guidelines for situations when it is better not to

give the massage on a given day e.g. parent illness. Trainers tested the parents at the second and the ninth visit to a 90% criterion of proficiency by having them to demonstrate the massage protocol on a doll. Training and testing continued at subsequent visits until the parent demonstrated proficiency. Ongoing parent training included discussion at each visit about how the massage was going at home and difficulties encountered with particular portions of it. This was documented in the record.

#### Evaluation and Testing Instruments.

Aspects of adaptive behavior were assessed using the Vineland-II Adaptive Behavior Scales (Sparrow, Cicchetti, & Balla, 2005). The Vineland Composite Scale and Communication, Daily Living Skills, Socialization, and Motor Skills domain scores were obtained. Standard scores were used in the analyses, with a mean of 100 and an s.d. of 15. Extensive reliability data are presented in the Survey Forms Manual (Sparrow et al., 2005). Internal consistency split-half reliability coefficients were .97 for the Composite Scale and ranged from .83 to .95 for the Domains. Test-retest coefficients (corrected for restriction of range) were .94 for the Composite Scale and ranged from .88 to .92 for the domains.

Autistic behavior was assessed with the Autism Behavior Checklist (ABC) (Krug, Arick, & Almond, 1980; 1993), a widely used screening device for autism Raw scores were used in the analyses, which could range from 0 – 167; with a score of 54 or higher being consistent with autism. Reliability estimates for the ABC have varied and have primarily focused on internal consistency. Eaves and Williams Jr. (2006) provided a review of the psychometric properties of the ABC and conducted reliability studies; they report an alpha coefficient of .89 for the total score, concluding the ABC total has adequate reliability for use as a screening instrument (p. 140).

Sensory impairment was assessed using the Sensory Profile (Dunn, 1999). The Sensory Profile is “a judgment-based caregiver questionnaire” that measures a child’s sensory processing abilities (Dunn, 1999, p. 1). It consists of 125 items grouped into three main sections: Sensory Processing, Modulation, and Behavioral and Emotional Responses. Each section is comprised of ratings for basic sensory systems. Internal Consistency was assessed using Cronbach’s Alpha. Mean coefficients alpha were .74 for Sensory Processing, .69 for Modulation, and .67 for Behavioral and Emotional Responses. Validity was established through literature and expert review, category analysis, and studies of convergent and discriminant validity (Dunn, 1999). A brief open-end questionnaire was completed by parents at the conclusion of the training sessions. This questionnaire asked parents to indicate their observations of their children’s behavior(s) upon completion of the training. Specific topic areas included sensory issues, speech/understanding, social and behavioral skills, self-help, digestion and sleep.

Data Collection Procedures. The pre- and post-testing was completed by experienced third party evaluators. Trainers involved in the training program were not involved in testing children with whom they had direct contact.

Data Analysis. To test for significant changes on measures of sensory impairment and adaptive behavior, pretest scores were subtracted from posttest scores to generate change scores. Because of the relatively small number of children, the wide variation in their scores on each measure and the wide variation in the amount the scores changed over the five months, the Wilcoxon-Sign test, a nonparametric procedure, was used to compare rank ordered change scores. The test statistic is based on the ranks of the absolute values of the differences between the two variables. A significance level of .05 was set to control for Type I error.

Two analyses were conducted to determine the equivalence of outcomes from the two groups. First, an independent t-test was conducted on mean gain scores to determine whether differences between the two groups were significant. Second, equivalence testing of outcomes was done using the Confidence Interval approach (Schuimann, 1981, 1987). Equivalence testing is useful in situations where the researcher wishes to show that two means are not statistically different and requires the identification of a clinically significant difference (delta) between outcomes of competing treatments. In practice, delta is often chosen to be a percentage (usually 15%-25%) of the mean of the comparison group (Mecklin, 2004). This number is then used to create a tolerance interval beyond which equivalence would be rejected. For this analysis the comparison group is the 2005 randomized control study treatment group in which the qigong treatment was provided by the Chinese Medicine trained physician and the delta was selected as 25% of the mean for the control group gain score. A unique tolerance interval was constructed for each outcome variable.

## Results

### Trainer and child demographics

(Insert Table 1 about here)

### Positive Changes in Children

Pre-test to post-test differences on the objective, standardized measures for the 26 children in the current study were all found to be statistically significant. The results are shown in Table 2 below. Probability values obtained via the Wilcoxon Signed Ranks Test were significant ( $n=26$ ,  $\alpha = .05$ ) and in the direction hypothesized for the: Vineland Composite and Vineland sub-domains, the total score on the Sensory Profile and all but one domain, and the Autism Behavior Checklist. See Table 2 for the statistical summary of these changes.

(Insert Table 2 about here)

Adaptive Behaviors. Treated children improved in overall adaptive behaviors as measured by the Vineland Inventory Composite score. The average improvement was 9.08 standard scores, ( $Z=3.93$ ,  $p < 0.000$ ). Treated children improved in daily living skills as measured by the Vineland inventory. The average improvement was 9.34 standard scores, ( $Z=3.01$ ,  $p < 0.005$ ). The predominant skills that were acquired were: removing and putting on clothing, feeding, assisting with chores, bathing, and wiping nose. Socialization also improved for treated children. The average increase in the Vineland standard score was 8.88 standard scores ( $Z= 2.99$ ,  $p < 0.005$ ) The predominant behaviors acquired were: beginning to play with siblings and peers, appropriate play with toys, use of names, adhering to social rules, making a friend, sharing possessions, and engaging in make believe play. Motor development improved for treated children. The average standard score increased 7.5 points ( $Z = 3.00$ ,  $p < .005$ ). On the Vineland communication domain, children standard scores increased and average of 9.04 points ( $Z = 3.62$ ,  $p < .000$ ).

Sensory Impairment. After five months of treatment, children demonstrated significant improvement in their sensory impairment as measured by their total Sensory Profile scores. The average improvement (decrease in impairment score) was 6.73 points ( $Z= -3.59$ ,  $p<.000$ ). The Sensory Processing scale which contains specific measures of the child's responses to auditory, visual, vestibular, touch and oral sensory stimulation showed that all five senses improved by an average of 2.15 points ( $Z = -3.16$ ,  $p< .005$ ).

The average improvement in impairment of modulation was 1.38 points ( $Z= -3.01$ ,  $p<.005$ ). The average improvement in impairment of behavioral and emotional responses to sensory experiences was 0.62 point which was not significant.

Autistic Behavior. Autistic behavior, as measured by the Autism Behavior Checklist, decreased in treated children by an average of 24.1 points ( $Z = -4.08, p < .000$ ).

These results indicate that children receiving the Qigong massage intervention demonstrate short-term improvement of sensory impairment and gains in adaptive behavior.

#### Effectiveness of Trainer Training

Four graduation criteria for trainers were set to assure a verifiable level and fidelity of implementation of the training program: 1) Trainers had to pass the final written exams and practical/skill assessments and complete all training sessions with the parents; 2) Parents receiving training should demonstrate mastery in giving the massage and 3) Trainers should demonstrate proficiency in adapting the massage to the child at their supervised visits.

Based on these criteria, 15 of the 18 trainers graduated with certificates of mastery. Two students dropped out of the program mid-way due to outside work demands, and a third dropped out early on due to health issues. The remaining students met training objectives at their supervised visits and completed the first three requirements for graduation. By the fifteenth visit, it was clear from the supervised visits that all students were on track for Certificate of Mastery, and feedback was given to students accordingly.

Graduating trainers were quickly able to establish rapport with parents and children and did not have difficulty in mastering the concepts from Chinese science necessary to teach parents qigong massage. The eligibility criteria for trainers appeared to ensure the necessary core skills to successfully complete the training. Trainer satisfaction was very high, and trainers verbalized their surprise at how much the children changed, and their pleasure in the direct work with families.

#### Effectiveness of Parent training.

Review of the parent testing documentation showed that all parents were able to give the massage correctly. Review of the research record showed that parents had reported giving the children the massage daily, within the recommended guidelines.

### Equivalence of Outcomes

In the small, randomized control trial conducted in 2005, significant short-term treatment effects were found between children receiving qigong massage from a Chinese medicine trained physician and children in a wait-list control group (Silva et al., 2007). To determine whether outcomes for children participating in the current study are comparable to those observed in the previous study, gain scores were compared. Treatment Group 1 (2005 study) consisted of the 13 children. Treatment Group 2 consisted of 26 children who completed the current pilot training study. Both groups had been selected from the same demographic area and were receiving similar early intervention services. Table 2 shows that while both groups were similar in age, Group 2 was significantly higher in overall adaptive functioning than Group 1. The comparison of mean pre- to post-test change values between the two groups is shown below in Table 3. *T-tests for independent samples* show no significant difference (37 d.f., alpha = .05) between the two groups in the Autism Behavior Checklist, Sensory Profile, and sub-domains of the Vineland Adaptive behavior test, indicating that children in this study improved as much as children in the first study.

(Insert Table 3 about here)

Because lack of difference does not necessarily mean equivalence, the Confidence Interval approach to equivalence testing was also conducted. Two means (in this case mean gain scores) can be determined to be equivalent if the 90% confidence interval of the mean difference is wholly contained within the tolerance limits set. As can be seen in Table 3 this condition is not

met, which is not surprising given the small sample sizes and the large standard deviations. Recent research by statisticians (Cribbie, Gruman & Arpin-Cribbie, 2004) indicates that while in practice, the Confidence Interval approach is superior to the common student's t-test with large samples, the student's t-test is actually superior to the CI approach with small samples and/or samples with large variances, given both tend to inflate the denominator in the t-statistic.

### Discussion

The results of this study suggest that the training was sufficient to train therapists to effectively deliver the intervention, and the outcomes can be similar across therapists with different educational backgrounds provided they successfully complete the QST training program. Furthermore, the results replicate earlier results in the earlier controlled study showing that the intervention is associated with significant short-term improvements in adaptive functioning and decreases in sensory impairment on standardized tests. While no statistically significant difference is demonstrated between these results and those obtained in the earlier study, statistical equivalence of effects cannot be established due in part to small sample size and large variances.

In the special education literature, there is research to suggest that children with higher cognitive function respond better to treatment interventions than those with lower cognitive function (Arick et al., 2003), as do children with higher adaptive skills (Lord & Schopler, 1989; Sparrow, 1997). An unanticipated consequence of the difference in overall functioning between children in the current and previous study was to permit a look at whether QST outcomes were different for higher vs. lower functioning groups as measured by standardized tests. As it turned out, there was no difference in QST outcomes between the higher and lower-functioning group.

While the results reported here continue a trend of encouraging findings regarding the

outcomes of a training intervention in Qigong massage for young children with autism, the reader is cautioned that several limitations attend this research which limit generalization. Foremost among these limitations is the absence of a true control/comparison condition such as would be found in a randomized controlled trial design. Secondly, sample sizes are small and thirdly the studies have not yet included long-term follow-up.

In conclusion, results of a prior study (2005) (N=13) and this study (N=26) indicate that for 39 children, significant short-term improvements of sensory impairment and social development were associated with receiving this intervention. Research on the intervention itself is still preliminary, and requires replication and extension via randomized control design, with larger samples of children with autism. In order for this to happen, a larger number of therapists need training to a standard of proficiency and to this end the QST training program will serve the next step in our research.

With the current openness in the West to treatment approaches from the East, there is a rise in collaborative research efforts looking for joint approaches to chronic illness and disability. This intervention is unusual in that it spans Chinese medicine, special education and parent training. The apparent ease of generalizing the Qigong Sensory Training procedures to select special education professionals and parents of children with autism, and the positive outcomes seen to date, lend preliminary support to the QST training program and collaborative research approach. As a result, a larger randomized controlled study of the methodology with 50 children and 20 QST trainers is currently underway and nearing completion.

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Table 1.

Participant demographics.

Demographic Variable	Study	
	Current QST Study (N=26)	Previous Controlled Study (N=13)
<b>Children</b>		
Gender		
Male	21	10
Female	5	3
Chronological Age (Months)		
Mean	56.3	59.3
S.D.	12.5	11.2
Minimum	31	35
Maximum	84	76
<b>Therapists</b>	15	1
Background		
Occupational Therapist	5	
Autism Specialist	3	
Teacher/Educator	2	
COTA	1	
Instructional Assistant	1	
Nurse	1	
Chiropractor	1	
Social Worker	1	
Chinese Medicine Trained Physician		1

Table 2.

Pre to post gains on measures of adaptive behavior and sensory impairment.

Variable	Pre-assessment (N = 26)		Post-Assessment (N = 26)		Wilcoxon Z statistics	Sig. p-value
	M	SD	M	SD		
Vineland Composite	68.6	12.2	77.7	14.5	3.93	<.000
Vineland Communication Domain	68.5	15.0	77.6	16.9	3.62	<.000
Vineland Daily Living Skills Domain	73.3	18.5	82.7	17.8	3.01	.003
Vineland Socialization Domain	70.9	13.0	79.8	13.9	2.99	.003
Vineland Motor Skills Domain	73.5	12.0	81.0	11.4	3.00	.003
Sensory Profile Total	21.0	11.8	14.5	10.7	-3.59	<.000
Sensory Processing	6.2	3.7	4.1	3.4	-3.16	.002
Sensory Modulation	4.6	3.3	3.2	2.7	-3.01	.003
Sensory Behavioral Response	3.4	1.9	2.8	1.6	-1.69	ns
Autism Behavior Checklist	66.0	25.1	41.9	22.1	-4.08	<.000

Table 3.

Difference and equivalence of mean gain scores for Chinese medicine trained physician and trained therapist interventions.

Variable	Chinese Medicine Trained Physician (N=13)		Trained Therapists (N=26)		Effect Size	t-test p-value	CI Within Tolerance
	M	SD	M	SD			
Vineland Composite *	6.23	8.96	9.08	9.84	0.302	.387	No
Vineland Communication	3.15	9.67	9.04	10.06	0.597	.089	No
Vineland Daily Living	8.23		9.38		0.093	.794	
Skills		10.69		13.89			No
Vineland Socialization	9.15	12.15	8.88	13.27	-0.021	.951	No
Vineland Motor Skills	7.25	12.95	7.50	10.79	-0.021	.951	No
Sensory Profile Total **	-8.46	9.85	-6.73	7.02	-0.202	.531	No
Sensory Processing	-2.38	2.69	-2.15	2.84	-0.083	.809	No
Sensory Modulation	-1.92	3.20	-1.38	2.12	-0.198	.533	No
Sensory Behavioral	-1.08		-0.62		-0.261	.465	
Response		1.55		1.96			No
Autism Behavior Checklist **	-13.31	24.08	-24.12	15.77	0.531	.100	No

\* An increase from pre to post represents a positive change on these measures.

\*\* A decrease from pre to post represents a positive change on these measures.

Footnote

<sup>1</sup> Qigong is pronounced “chee-gong”