
Outcomes of a Pilot Training Program in a Qigong Massage Intervention for Young Children With Autism

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KEY WORDS

- autism
- early intervention
- qigong massage
- Qigong Sensory Training
- sensory impairment

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 doctor of Chinese medicine was shown to improve sensory impairment and adaptive behavior in a small controlled study of young children with autism. In 2006, the Qigong Sensory Training (QST) program was developed to train early intervention professionals to provide the QST intervention. This article describes the preliminary evaluation of the QST program as piloted with 15 professionals and 26 children and outcomes testing using standardized tests of sensory impairment and adaptive behavior. Results of outcomes comparing delivery by QST-trained therapists with delivery by a doctor of Chinese medicine showed that both groups improved and that there was no difference in outcome between the two groups. The intervention and training program are described, and implications for future research are discussed.

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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 underreacting 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 overreactive, underreactive, 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 affect the core deficits in autism (Baranek, Foster, & Berkson, 1997; Dawson & Lewy, 1989; 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. Although effective aids to communication are available (Frost & Bondy, 1994), a specific intervention directed at correcting the specific sensory abnormalities of each child is not. The most recent review of all therapies for the sensory impairment of autism indicates that in the critical years when early intervention is helpful, no widely recognized, effective, and definitive treatment exists (Baranek, 2002).

Chinese Medicine and Qigong Massage

In light of the current openness in the West to treatments used in the East, and in search of gentle, noninvasive treatment approaches for young children with autism,

we asked, “What does Chinese medicine have to offer for sensory impairment and autism?” This article describes the third research study on 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 the Chinese medicine concept of energy and energy channels (Yang, 2005).

All 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 noninvasively with massage (Chengnan, 1990). Compared with 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 neurotransmitters (Stux & Hammerschlag, 2001). Research evaluating the effect of treatment on acupuncture points on the extremities with positron emission tomography (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 et al., 2001). The expanding envelope of knowledge resulting from Western scientific research is often uneven, and although the research on the full elucidation of *how* Chinese medicine works is still early, numerous published studies over the past three decades indicate that it does work for a multitude of illnesses; those scientific studies measure results before and after treatment using the gold standards of quality research: controlled studies, standardized testing, and blinded examiners (Kaptchuk, 2002).

Qigong massage differs from ordinary massage in that it is based on understanding the body’s 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 to build their health and awareness of energy. It is understood that qigong treatment demands energy of the practitioner and that to treat patients who are ill, the practitioner should be healthy and have abundant energy. Before beginning treatment, the practitioner centers himself or herself using a qigong exercise. Specific manual techniques are then used taking into consideration the direc-

tion 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 child according to concepts from Chinese medicine such as toxicity, deficiency, and block. The parent massage is important because 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 an ancient idea in Chinese medicine, the senses are considered to be the doors and windows on the world—the way by which children’s awareness can move between their inner world and the outer world. In autism, those doors are considered partially closed, such that the children live more in their inner world and are less aware of the world around them. Because 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 these children’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 3 to 6 years of age were randomly assigned to a treatment or a waitlist control group. Both groups of children were enrolled in early intervention services that included occupational therapy and speech therapy. All children were pre- and posttested with standardized measures of sensory impairment and adaptive behavior. At the end of 5 months, treated children showed decreased sensory impairment and improved adaptive behaviors compared with 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 whether similar

improvements in children would occur when Western-trained persons completed a training and skill-development program to deliver this intervention. The 80-hr 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 as follows:

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 early intervention/early childhood special education personnel demonstrate proficiency in providing the intervention after completion of the QST training program?
3. If the children do exhibit positive outcomes, are the 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 pretest–posttest single group design was used to address Question 1. Question 2 was answered by evaluation of the trainers during supervision according to set criteria. To answer Question 3, a pre–post comparison group design was employed for difference and equivalence testing (Schuirmann, 1981, 1987) using results from the 2005 experimental treatment group.

Method

Selection of QST Trainers

Three prerequisites for training were identified: (1) trainers should have a minimum of 3 years of experience working with children with autism to allow them the skills necessary to engage the child in the qigong massage and establish a working relationship with the parent, (2) trainers should be healthy and energetic by their own assessment, and (3) the trainers should not be 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 people working in early intervention programs with children who have autism because the ESD collaborating with this research wanted to begin offering QST through its occupational therapists.

Because not enough people from the two fields applied for the training, 6 of 18 trainers recruited included a chiropractor, a social worker, 2 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 ESD covering three adjacent counties in Oregon. An invitation letter was sent out to parents of all children between 3 and 6 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 as follows: (1) younger than 6 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 hr 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 child (e.g., 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 6 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 5-month period of supervision and an additional 12 hr 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 5-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 5 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 videotaped and edited as a teaching presentation of the progress of each of the 26 children. The video was shown to the trainers at the mid and end-point of treatment to allow for further skill development. On completion of the 5-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.

Qigong Massage Protocol. The qigong massage itself consists of a 15-min 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 biweekly individualized version of the massage protocol that advances the progress of the child, and the 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 12th movement was added to help address the functional impairment to hearing. The actions of the 12 movements according to Chinese meridian theory are briefly described here:

- 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, 6: Promote social interaction, speech and self-soothing.
- Movements 7, 8: Strengthen 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 5 months, the trainer met with the parents and child 21 times, providing the parent with a total of 11 h of training in the daily follow-through massage using the 12-part protocol previously mentioned. Each training session lasted approximately 30 min. 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 impor-

tance 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). 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 *SD* 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 to 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 (2006) provided a review of the psychometric properties of the ABC and conducted reliability studies; they reported 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 consisted of 125 items grouped into three main sections: sensory processing, modulation, and behavioral and emotional responses. Each section consisted of ratings for basic sensory systems. Internal consistency was assessed using Cronbach's alpha. Mean coefficients for 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-ended 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) on 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 posttesting 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 5 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 (Schuirmann, 1981, 1987). Equivalence testing is useful when 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, 2002). 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

Positive Changes in Children. Table 1 presents demographic information on the two groups of participants in the current and previous study. Participants in the two studies were similar in gender distribution and age. The two groups differed on initial assessments of adaptive behaviors. Trained therapists represented a variety of backgrounds.

Table 1. Participant demographics

Demographic Variable	Study	
	Current QST Study (<i>N</i> = 26)	Previous Controlled Study (<i>N</i> = 13)
Children		
Gender		
Male	21	10
Female	5	3
Chronological age (months)		
Mean	56.3	59.3
<i>SD</i>	12.5	11.2
Minimum	31	35
Maximum	84	76
Preassessment Vineland Composite Scale Scores		
Mean	68.6	58.2
<i>SD</i>	12.2	12.9
Therapists		
Background		
Occupational therapist	5	
Autism specialist	3	
Teacher/educator	2	
Occupational therapy assistant	1	
Instructional assistant	1	
Nurse	1	
Chiropractor	1	
Social Worker	1	
Chinese medicine-trained physician		1

Pretest to posttest 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. 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 subdomains, the total score on the Sensory Profile (the Sensory Profile has 3 domains as well as a total score), and the Autism Behavior Checklist. See Table 2 for the statistical summary of these changes.

Adaptive Behaviors. Treated children improved in adaptive behaviors as measured by the Vineland Inventory Composite score. The average improvement was 9.08 standard score points ($Z = 3.93$, $p < .00009$). Treated children improved in daily living skills as measured by the Vineland Inventory. The average improvement was 9.34 standard score points ($Z = 3.01$, $p < .003$). The predominant skills were acquired were as follows: 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 score points ($Z = 2.99$, $p < .003$). The predominant behaviors acquired were as follows: beginning to play with siblings and peers, appropriately playing with toys, using names, adhering to social rules, making a friend, sharing possessions, and engaging in make-believe play. Motor development improved

Table 2. Preassessment to Postassessment Gains on Measures of Adaptive Behavior and Sensory Impairment

Variable	Preassessment (N = 26)		Postassessment (N = 26)		Wilcoxon Z	p ^a
	M	SD	M	SD		
Vineland Composite	68.6	12.2	77.7	14.5	3.93	.00009
Vineland Communication Domain	68.5	15.0	77.6	16.9	3.62	.0003
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	.0003
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	.00005

Note. ns = not significant.

^aAll Z statistics were significant except for Sensory Behavioral Response.

for treated children. The average standard score increased 7.5 points ($Z = 3.00, p < .003$). On the Vineland Communication domain, children's standard scores increased an average of 9.04 points ($Z = 3.62, p < .00003$).

Sensory Impairment. After 5 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 ($Z = -3.59, p < .0003$). 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 ($Z = -3.16, p < .002$).

The average improvement in impairment of modulation was 1.38 points ($Z = -3.01, p < .003$). 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 ABC, decreased in treated children by an average of 24.1 points ($Z = -4.08, p < .00005$). 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 ensure a verifiable level and fidelity of implementation of the training program: (1) Trainers must 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 midway because of outside work demands, and a third dropped out early on because of health issues. The remaining students met training objectives at their supervised visits and completed the first three requirements for graduation. By the 15th 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 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 1 shows that although both groups were similar in age, Group 2 was significantly higher in adaptive functioning than Group 1, as measured by the Vineland Composite Score. The comparison of mean pre- to posttest change values between the two groups is shown in Table 3. *T* tests for independent samples show no significant difference ($\alpha = .05$, $df = 37$) between the two groups in the ABC, Sensory Profile, and subdomains of the Vineland Adaptive behavior test, indicating that children in this study improved as much as children in the first study.

Because lack of difference does not necessarily mean equivalence, the confidence interval (CI) approach to equivalence testing was also conducted. Two means (in this case mean gain scores) can be determined to be equivalent if the 90% CI of the mean difference is wholly contained within the tolerance limits set. As can be seen in Table 3, this condition is not met, an outcome that is not surprising given the small sample sizes and the large standard deviations. Recent research by statisticians (Cribbie, Gruman & Arpin-Cribbie, 2004) indicates that although in practice, the CI 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 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. Moreover, 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. Although 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, research suggests that children with higher cognitive function respond better to treatment interventions than do 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 functioning between children in the current and previous study was to permit a look at whether QST outcomes were different for higher versus lower functioning groups as measured by standardized tests. As it turned out, no difference in QST outcomes was found between the higher- and lower-functioning group.

Although the results reported here continue a trend of encouraging findings regarding the outcomes of a training intervention in Qigong massage for young children with

Table 3. Difference and Equivalence of Mean Gain Scores for Chinese Medicine–Trained Physician and Trained Therapist Interventions

Variable	Chinese Medicine– Trained Physician (<i>N</i> = 13)		Trained Therapists (<i>N</i> = 26)		Effect Size	<i>t</i> -Test <i>p</i> ^c	CI WithinTolerance?
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Vineland Composite ^a	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 Skills	8.23	10.69	9.38	13.89	0.093	.794	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 ^b	–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 Response	–1.08	1.55	–0.62	1.96	–0.261	.465	No
Autism Behavior Checklist ^b	–13.31	24.08	–24.12	15.77	0.531	.100	No

Note. CI = confidence interval.

^aAn increase from preassessment to postassessment represents a positive change on these measures.

^bA decrease from preassessment to postassessment represents a positive change on these measures.

^cNone of the differences were significant.

autism, the reader is cautioned that several limitations attend this research that 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. Second, sample sizes are small, and third, 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. 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, the number of collaborative research efforts looking for joint approaches to chronic illness and disability is increasing. This intervention is unusual in that it spans Chinese medicine, special education, and parent training. The apparent ease of generalizing the QST procedures to select special education professionals and parents of children with autism, along with 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 under way and nearing completion. ▲

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