Treatment of Tactile Impairment in Young Children with Autism: Results with Qigong Massage†

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Background: Following the inclusion of sensory abnormalities in the diagnostic criteria for autism, evidence has emerged showing that tactile abnormalities in young children with autism are severe, universally present, and directly related to delay of early self-regulation milestones required for social development. Parent touch is the most effective means of stimulating early self-regulation, yet parents of children with autism avoid touch because their children respond abnormally to it. This suggests that tactile abnormalities pose a barrier to parent touch in autism, and that treatment of tactile abnormalities may improve developmental outcomes. We have developed a qigong massage treatment for tactile abnormalities in young children with autism. Here we evaluate whether tactile abnormalities decrease following treatment, and whether treatment results in improved self-regulatory outcomes.

Methods: We retrospectively analyzed our qigong massage database for treatment effect on tactile abnormalities, self-regulatory delay, and parenting stress. Five-month interval data were available for 129 children with autism aged 3–6 years. Of these 129, 97 received treatment and 32 were in the wait-list control condition. There were no differences between treatment and control groups by age, gender, or severity of tactile impairment.

Results: Treatment resulted in significant decreases of tactile impairment, self-regulatory delay, and parenting stress ($p < .001$ on all paired *t*-tests); mean decreases were 25.5%, 24.5%, and 35.8%, respectively. Results were significant compared to controls [$F(3,122) = 11.27$, $p < .001$]. In the pretreatment data, tactile impairment was directly related to self-regulatory delay; post-treatment, both variables decreased proportionally.

Conclusion: Results demonstrate that tactile impairment in young children with autism is treatable with a qigong massage protocol. The direct relationship between tactile impairment and self-regulatory delay pretreatment, and the proportional decrease of both following treatment, suggest that tactile impairment is a cause of self-regulatory delay, and that qigong massage is a promising avenue to improve developmental outcomes in autism.

KEY WORDS: autism, autism spectrum disorders; tactile impairment; young children; self-regulatory delay; treatment; qigong massage

INTRODUCTION

Abnormal sensory responses are included with core diagnostic autism symptoms in the new DSM-5 released May 2013.[1] Evidence suggests that, of all the senses, it is abnormalities of touch that have the most impact on social delay in autism. Touch is the sense that is most involved in social development[2] and, of the triad of core features characteristic of autism, it is social delay—rather than communication delay or behavioral abnormalities—that distinguishes autism from the other developmental disorders.[3] Severely abnormal responses to touch are near universally present in young children with autism[4,5] and are associated with increased severity of autism.[6] Recent studies identified a pattern of tactile abnormalities specific to young children with autism characterized by painful withdrawal from gentle touch (allodynia) and hyposensitivity to injurious stimuli (hypoesthesia).[4,7] This pattern of pain and numbness was directly related to a second distinguishing characteristic: severe global delay of early self-regulation milestones.[4,7] Thus, for the first time in autism research, a link between tactile abnormalities and self-regulatory delay was established. This not only raises the possibility that tactile abnormalities present a barrier to self-regulatory development, but also that treatment of tactile abnormalities may improve developmental outcomes for young children with autism.

In young children, the timely unfolding of social development rests upon a foundation of earlier self-regulation milestones.[8] Attuned parental touch stimulates the development of these milestones by repeatedly activating parasympathetic nervous system (PsNS) functions, while at the same time, stimulating social receptivity via the social engagement system of the brain.[2,9,10] The first four self-regulation

milestones emerge in the first year: the ability to self-soothe, to regulate orientation/attention, to regulate sleep/wake cycles, and to regulate digestion.[11] Of these, the ability to relax, orient, and focus on the face and voice of another person, are particularly important to learning language and social skills. Children who are deprived of touch in the first year show delay in these areas;[10] massage is used to successfully reverse delay.[12] In the third year of life, building on first-year milestones and early language development, the fifth self-regulation milestone emerges: the ability to regulate behavior and emotions in response to social cues. This important social self-regulation milestone emerges by age 3.[8,11] It is the failure to achieve this fifth milestone that is relevant to autism, in that it constitutes the defining characteristic of autism—social delay by the age of three.

In autism, responses to touch are severely abnormal, and parent touch does not relax and stimulate social receptivity as it would in a typical child. Instead, children reject or avoid touch on many areas of skin, and parents quickly learn to avoid touching these areas. As parents touch their children less and turn to less effective means of regulating behavior,[13] the tactile stimulus to self-regulatory development diminishes. By the time children reach pre-school age, severe, global delay of the five early self-regulation milestones is present.[4,7] The impact of all this on parenting stress cannot be overestimated. Parents are expected to effectively regulate their children's behavior when necessary, but with the auditory channel of communication compromised by language delay, and the tactile channel of communication compromised by tactile impairment, it is extremely difficult to do so. Recent data indicate that parenting stress in autism reaches a level that is four times that of typically developing children and is frequently characterized by the feeling that "at times we cannot cope".[14]

For the past decade, our group has developed and researched a qigong massage treatment protocol directed at tactile impairment and self-regulatory delay in young children with autism (Qigong Sensory Training, (QST)). The massage techniques are derived from Chinese medicine and are specifically directed towards normalizing the child's tactile responses. To our knowledge, although both massage and occupational therapy[15,16,17] have been used for sensory abnormalities in autism, this is the first time that a treatment has been developed specifically for tactile impairment. In order to evaluate the results of treatment, we developed and validated two measures: the Sense and Self-Regulation Checklist (SSC) and the Autism Parenting Stress Index (APSI).[7,14] The results of five months of treatment were significant improvement of sensory, self-regulatory, and parenting stress variables, and promising decrease in severity of core autism symptoms.[18,19] When our data showed that of all the sensory abnormalities, it was tactile abnormalities that most strongly differentiated children with autism from other groups,[7] and that these same tactile abnormalities were universally present in the children with autism,[4] we arrived at the conclusion that tactile abnormalities were of special importance to understanding autism.

Our clinical observations, carried out over more than a decade of research and treatment of several hundred children, suggest that tactile abnormalities are important because they pose a barrier to parental touch. The following description of what typically happens over the course of massage treatment will serve as an illustration. Children enter treatment with poorly regulated behavior, limited ability to communicate, and avoidance of touch. They are not socially receptive. Parents, aware of the tactile difficulties, have learned to minimize and avoid touch. Behavior is difficult to manage and parenting stress is high. Children withdraw from touch on multiple areas of the body. The main focus of the first one to three months of massage is on training parents not to avoid areas of difficulty, but instead to support the child and use specific massage techniques to resolve the difficulties.[20] Once tactile abnormalities resolve, withdrawal from touch disappears. From this point forward, massage initiates a strong stimulation to self-regulation—children calm down, tantrums diminish; sleep and digestion improve; children make eye contact and become receptive to social interaction. Conditions for communication improve. Children ask for the massage, parents see that they like it, and touch re-enters the parenting dynamic as an effective parenting tool. Parenting stress is reduced. Touch is reestablished as an ongoing stimulus to self-regulatory development.

Until this year, when sensory abnormalities were still classified as a comorbid symptom in autism, none of these clinical observations could be considered as directly relevant to autism. But with the reclassification of sensory abnormalities as a core autism symptom and emerging research showing the importance of tactile abnormalities to self-regulatory delay in autism, it is now relevant to report on the efficacy of qigong massage as a treatment for tactile abnormalities. Furthermore, it is relevant to explore whether tactile abnormalities are a cause of self-regulatory delay in autism. Here we reanalyze our qigong massage treatment database with the following research questions in mind:

1. What is the effect of qigong massage treatment on tactile abnormalities, self-regulatory development, and parenting stress in young children with autism?
2. What is the relationship between tactile abnormalities and self-regulatory delay in the pretreatment data, and how does it change following massage treatment?

3. What is the relationship between tactile abnormalities and parenting stress in the pretreatment data, and how does it change following massage treatment?
4. Are parent reports of decreased tactile abnormalities following massage confirmed by direct observation by therapists?

METHODS

Research Design

This study is a retrospective analysis of our SSC and APSI autism research data. These data contain parent-reported pre–post treatment results specifically on tactile response not previously analyzed, and reported data from studies measuring the effect of massage treatment on sensory, self-regulatory, and parenting stress variables.[19,20] Studies used repeated measure and randomized controlled designs; one randomized controlled study is ongoing. Completed studies, not including tactile outcomes, have been previously published.[18,19] Data using an earlier version of the SSC were not included in this paper.

Parent-reported data on tactile abnormalities are compared with therapist-reported data. Pre- and post-treatment therapist reports of abnormal responses to touch by area were available from one completed randomized controlled trial (RCT),[19] and one ongoing RCT (http://www.clinicaltrials.gov, #NCT0180169).

All studies were carried out with Institutional Review Board approval through Western Oregon University.

Participants

Our research database contained five-month interval data for 129 children with autism aged 3–6. Of these 129, 97 children had QST treatment, and 32 were in the wait-list control condition. The majority of data were from children participating in the validation study of the SSC.[7] The remainder were children with pre–post treatment data from an ongoing RCT (#NCT0180169). Therapist data evaluating tactile abnormalities were available for 52 of the 97 treated children.

Participants were recruited by invitation letter from six early-intervention programs providing services to children with the diagnosis of autism in Oregon. Inclusionary criteria were: (a) age under six; (b) confirmation of autism by DSM-IV criteria; (c) receipt of early-intervention services for autism; (d) absence of other disability; (e) no psychotropic medication; and (f) no new autism therapies planned during the study. Informants were primary caregivers for the children concerned. Table 1 provides demographic information.

Table 1. Participant Demographics

	Group	
	Treatment	*Control*
N	97	32
Boys	79	25
Girls	18	7
Average Age (in years)	3.87	4.16
SD of Age	1.11	0.95

Intervention

Treatment consisted of a program of daily parent-delivered qigong massage and weekly therapist support known as Qigong Sensory Training (QST). Data from two intensities of the intervention were included: the QST Parent Intervention, in which parents gave the intervention daily for five months, and the QST Dual Intervention, in which daily parent massage is supplemented by weekly therapist-delivered massage. Both intensities are effective in improving sensory abnormalities.[18,19] In both intensities, parents receive an initial group parent training and ongoing, targeted instruction on adapting the massage technique to the individual child's responses. Fidelity procedures were implemented and met criteria. Therapists participating in the study completed a 60-hour course involving training and supervision in massage procedures. More detail on therapist training is provided under the "Therapist Reports" section heading below.

Treatment is based on principles of Chinese medicine. It is intended to give the child an organized daily whole-body intervention that is closely attuned to the child's responses to touch, and addresses specific areas of difficulty with specific techniques that have had success in resolving those difficulties. The parent protocol is described in detail in a parent training handbook and DVD.[20] It takes about 15 minutes, and is usually given at bedtime, with children in pajamas. It consists of 12 parts following the acupuncture channels on the front and back of the body, with manual strokes carried out in a downward direction. A combination of patting and pressing strokes is used, with technique adapted to the child's response to massage on each area. In areas where the child withdraws from touch, a quicker lighter technique is used, and in areas where the child is ticklish, a slower technique with more pressure is used. Upwards gentle shaking movements of the child's arms are used, and in situations where pressure on the toes does not improve withdrawal from touch, bicycle-movements of the leg are used. Principles determining the choice of technique are based on Chinese medical theory that withdrawal from touch on certain areas of skin reflects

inadequate local circulation; massage techniques are designed to improve local circulation. For a summary of the massage movements, see Supplementary Materials Appendix A.

Parent instruments

Parent instruments evaluated changes in tactile responses, self-regulatory delays, and parenting stress using the Sense and Self-Regulation Checklist (SSC) and the Autism Parenting Stress Index (APSI). The SSC is a parent/caregiver measure of abnormal sensory responses and self-regulatory difficulties in preschool children.[21] It has demonstrated acceptable levels of internal consistency (alpha = 0.87) and test-retest reliability (coefficient = 0.677). The touch/pain section gathers information relative to unusually high pain thresholds to injury, and withdrawal from or avoidance of gentle touch on six areas of the body (face, scalp, hands, feet, diaper area, and body skin). The Touch/Pain domain has an internal consistency of alpha = 0.749. Items are rated as Never (0), Rarely (1), Sometimes (2), or Often (3). Mean and standard deviation tactile scores for typical children and children with autism in the validation study were 9.18 (SD 5.21), and 20.53 (SD 7.31). Higher scores mean greater dysfunction. The SSC can be viewed in its entirety in Supplementary Materials Appendix B. The questions are shown in Table 2.

The self-regulatory section of the SSC asks for a rating of self-regulatory difficulties relative to foundational self-regulatory milestones: sleep (e.g., difficulty falling asleep, awakens very early); digestion (e.g., bowels are loose, constipated, requires regular laxatives); orientation/attention (e.g., has to be prompted to make eye contact, stares off into space); self-soothing (e.g., difficulty with tantrums and transitions); and poorly regulated behavior (e.g., aggressive and self-injurious behavior). Mean self-regulatory scores for the two groups in the validation study were Typically Developing 20.59 (SD 9.97), and Autism 43.07 (SD 9.46).[7]

The Autism Parenting Stress Index was developed in tandem with the SSC.[14] It measures parenting stress relative to 13 aspects of self-regulation of concern to parents (social, communication, tantrums, aggression, self-injurious behavior, transitions, sleep, diet, bowel problems, toilet training, not feeling close to the child, and concern for future independence and acceptance). Items are ranked as: Not stressful (0), Sometimes creates stress (1), Often creates stress (2), Very stressful on a daily basis (3), and So stressful that

TABLE 2. Touch/Pain Questions on the Sense and Self-regulation Checklist

Question	*Hypoesthesia*	*Allodynia*	*Skin Area*
Head bangs on a hard surface	√		Scalp
Head bangs on a soft surface	√		Scalp
Does not notice if the diaper is wet or dirty	√		Buttocks
Does not cry tears when hurt	√		
Cries tears when falls, scrapes skin, or gets hurt (this question is scored when answered in the negative)	√		
Face washing is difficult		√	Face
Haircuts are difficult		√	Scalp
Refuses to wear a hat		√	Scalp
Prefers to wear a hat		√	Scalp
Cutting fingernails is difficult		√	Fingers
Prefers to wear one or two gloves		√	Fingers/hands
Avoids wearing gloves		√	Fingers/hands
Cutting toenails is difficult		√	Toes
Will only wear certain footwear (e.g., loose shoes, no socks)		√	Toes/feet
Prefers to wear the same clothes day after day		√	Body
Will only wear certain clothes (e.g., no elastic, not tight, no tags, long or short sleeves or pants)		√	Body

sometimes we feel we cannot cope (5). The instrument has acceptable levels of internal consistency (alpha = 0.83) and test-retest validity (coefficient 0.88). Mean scores for the typically developing and autistic groups in the validation study were: Typically developing 5.41 (SD 5.18), Autism 24.13 (SD 10.39). Higher scores mean greater dysfunction.[14]

Therapist reports

Therapists trained in the QST Dual Intervention reported on children's responses to touch on the different parts of the body. In the 60-hour training for this intervention, therapists learned to closely observe and document withdrawal or avoidance of touch on different parts, and to modify massage technique accordingly. Therapist reports documented abnormalities on the head, fingers, chest, abdomen, thighs, calves, toes, and soles. For the purposes of this research, areas were scored abnormal if abnormal responses were present on two out of three of the first and last visits. Therapists participating in the QST Parent Intervention did not document children's responses to touch.

Analysis

Simple pre–post descriptive analyses were conducted to describe each sample. This was followed by paired *t*-tests on the pre–post data to compare treatment and control group samples.

To more formally test for treatment effects, we first determined the equivalence of the treatment and control group children using MANOVA on pretreatment data, followed by MANCOVA to test for both a main treatment effect, as well as Bonferroni-adjusted post hoc univariate analyses on individual variables.

Scatter plots of 'self-regulatory difficulties' and 'abnormal tactile responses' for pre- and posttreatment for children with autism were visually inspected to determine linearity and direction of relationship. Regression analyses were used to determine the strength and nature of the relationship between abnormal tactile response and self-regulatory difficulties and whether they remain related when improvement of self-regulatory abilities occurs from the intervention. Simple descriptive statistics were used to compare observed changes in tactile response by parents and therapists.

RESULTS

Comparing Treatment Effects

Table 3 displays both descriptive data and paired *t*-test results for children in the treatment and control conditions. A MANOVA test comparing pretreatment data for treatment and control groups yielded an overall insignificant F-value for all variables [F (3,125) = 1.96, $p = .123$]. Posttreatment results indicate qigong massage treatment resulted in significant improvement of tactile impairment, self-regulatory delay, and parenting stress ($p < .001$ on all paired *t*-tests). Mean reductions of tactile impairment, self-regulatory delay, and parenting stress in treated groups were 25.5%, 24.5%, and 35.8%, and 4.3%, 3.7%, and 16.3% in control groups. These reductions represent considerable movement toward scores seen in typically developing children.[7,14]

An overall treatment effect was found [F (3,122) = 11.27, $p < .001$]. A Partial Eta^2 value of 0.217 is in the large effect size range. Further, Bonferroni-adjusted post hoc univariate effects were detected on all three variables of interest. Effect size estimate for treatment effects on self-regulatory difficulties is in the large range. The effects size estimate for abnormal tactile response is in the medium–large range and the effect size estimate for parenting stress is in the medium range. These results are shown in Table 4.

These results indicate that qigong massage treatment has a positive effect on reducing abnormal tactile response, self-regulatory difficulties, and parenting stress.

Relationships Between Self-regulatory Abilities and Abnormal Touch/Pain Response

Significant improvements (in this case, lower scores) in tactile response (t = 7.05, $p < .001$), and self-regulatory abilities (t = 9.97, $p < .001$) were present. Separate regression analyses of abnormal tactile responses on self-regulatory difficulties were compared and conducted using pre- and posttreatment data (see Figure 1). An F-test determined that the shift in posttreatment was significant [F (2,190) = 73.24, $p = .001$]. The interaction term between time and abnormal tactile response proved to be insignificant [F (1,192) = 2.89, $p = .091$]. Results for this sample of children indicate that abnormal tactile responses and self-regulatory difficulties decreased proportionally following qigong massage treatment.

Relationships Between Abnormal Touch/Pain Response and Parenting Stress

Significant improvements in tactile response (t = 7.05, $p < .001$), and parenting stress (t = 9.08, $p < .001$) were present. Separate regression analyses of abnormal tactile responses on self-regulatory difficulties were compared and conducted using pre- and posttreatment data (see Figure 2). An F-test determined that the shift in posttreatment data was significant, [F (2,190) = 140.22, $p = .002$]. The interaction term between time and abnormal tactile response was found to be insignificant [F (1,192) = 0.654, $p = .420$]. Results for this sample of children indicate that abnormal tactile responses and parenting stress decreased proportionally following qigong massage treatment.

Table 3. Pre- and Post-scores for Children with Autism in Treatment and Control Conditions

Group/Variable	*Premean (SD)*	*Postmean (SD)*	*Difference*	*t value*	*p value*
Treatment Condition (N = 97)					
Abnormal Tactile Response	20.91 (7.13)	15.57 (6.86)	-5.34	-7.05	<.001
Hypoesthesia	4.68 (2.78	3.49 (2.48)	-1.19	-4.05	<.001
Allodynia	16.23 (5.84)	12.07 (5.76)	-4.16	-6.62	<.001
Parenting Stress	24.35 (10.62)	15.76 (8.16)	-8.59	9.08	<.001
Self-Regulatory Difficulties	45.43 (11.21)	34.30 (10.88)	-11.13	9.97	<.001
Control Condition (N=32)					
Abnormal Tactile Response	22.31 (8.52)	21.34 (8.41)	-0.97	-.925	.362
Hypoesthesia	4.69 (2.71)	4.13 (3.05)	-0.56	1.12	.273
Allodynia	17.63 (6.35)	17.22 (6.82)	-0.41	0.55	.587
Parenting Stress	24.42 (11.62)	21.53 (11.08)	-2.89	-2.23	.033
Self-Regulatory Difficulties	50.94 (15.69)	49.03 (15.45)	-1.91	-.938	.355

Table 4. Results for Comparison of Treatment and Control Group Children

		Group Main Intervention Effect		
Variables		*F*	*p*	*Partial Eta2*
Multivariate Analysis		11.27	<.001	.217
ALL	df (3,122)			
Post Hoc ANCOVA				
Abnormal Tactile Response	df (1,124)	15.96	<.001	.114
Self-Regulatory Difficulties	df (1,124)	33.54	<.001	.213
Parenting Stress	df (1,124)	12.67	.001	.093

Parent and Therapist Observations of Changes in Tactile Responses

Parent ratings of changes in tactile responses were derived from pre–post qualitative data from the Sense and Self-Regulation Checklist. Therapist ratings of changes were derived from records of direct observation of the child's response to massage on specific areas of the body. Both reported significant improvement of tactile responses. Based

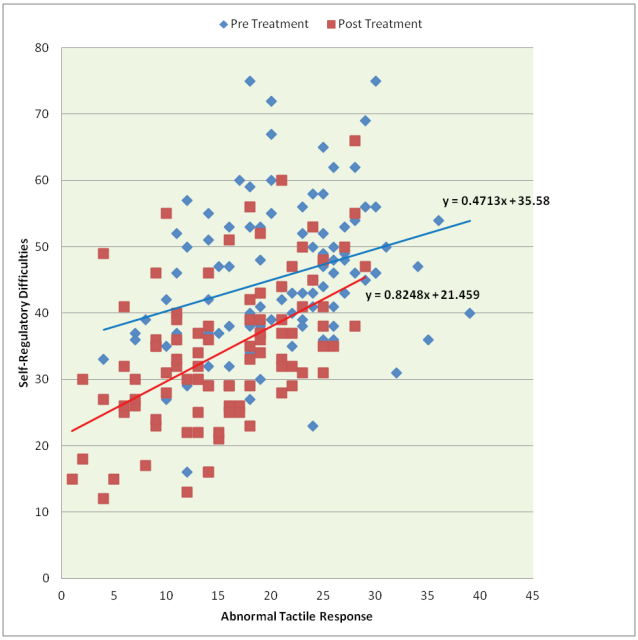

Figure 1. Pre–post treatment scatter plot of abnormal tactile responses vs. self-regulatory difficulties for the group with autism with slopes.

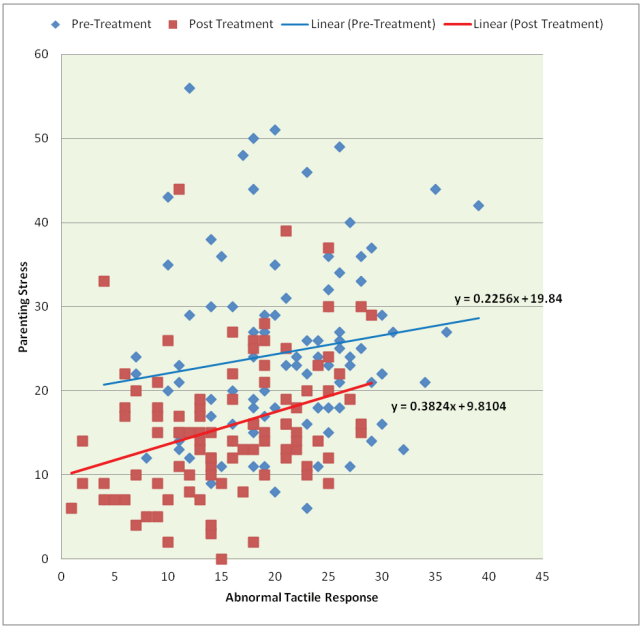

Figure 2. Pre–post treatment scatter plot of abnormal tactile responses vs. parenting stress for the group with autism with slopes.

on parent reports, 73.6% of children improved following treatment; based on therapist reports, 94.3% of children improved following treatment. Therapist reports confirmed parent reports, with direct observation being the more sensitive measure (see Table 5).

Table 5. Parent and Therapist Reports

	Pretreatment	*Posttreatment*
Parent Report		
Tactile SSC Mean Score	21.6	15.2
Therapist Report		
Total Areas Impacted (Mean)	2.87	0.60
4 Areas	30.2%	0.0%
3 Areas	35.8%	3.8%
2 Areas	24.5%	11.3%
1 Area	9.4%	26.4%
0 Areas	0.0%	58.5%
Specific Areas Impacted		
Scalp	96.2%	34.0%
Fingers	56.6%	9.4%
Body	58.5%	15.1%
Feet	75.5%	1.9%
Percent of children showing improvement based Parent Report	73.6%	
Percent of children showing improvement based on Therapist Report	94.3%	
Parent-Therapist agreement	73.6%	

DISCUSSION

This study represents the first documented evidence resulting from formal research that tactile abnormalities in young children with autism are significantly improved following qigong massage, and that treatment also improved child self-regulation and decreased parenting stress. Self-regulatory delay and parenting stress were directly related to tactile impairment, and treating tactile impairment resulted in proportional reductions of both (see Figures 1 and 2). These findings, in concert with the universal presence of tactile abnormalities in autism and the known importance of touch to the development of early self-regulation,[2] suggest that tactile impairment is a significant cause of self-regulatory delay and parenting stress in autism, and that treatment of tactile abnormalities represents a promising avenue to improve developmental outcomes and reduce parenting stress in young children with autism.

Pretreatment, the mean tactile and self-regulatory scores for these children with autism were about twice those of typically developing children of the same age. After five months of massage, the autism group

had made 49% and 45% of the progress necessary to bring them to within normal range for tactile and self-regulatory scores—nearly half way. Our experience suggests that the intervention should be given daily for a year for maximum improvement, and that in some cases a full return to normal is possible.[7] A large, three-year study is currently underway to definitively answer the question of time to maximum improvement across a range of autism severity.

This research goes some distance towards illuminating a developmental basis for autism and a rational means of treating it. Autism is a developmental disorder with a diagnosis that is characterized more by what is slow to emerge (social and language abilities), than by what does emerge (behavioral and sensory abnormalities). When we differentiate autism from other neurodevelopmental disabilities, the component of the diagnosis that is specific to autism is social delay by the age of 3, or, in self-regulatory terms, delay of social self-regulation by the age of 3. In development, milestones are built upon earlier milestones, and if the first four self-regulation milestones are delayed, the fifth social self-regulation milestone must also be delayed. Thus, global delay of first-year self-regulation milestones results in social delay by the age of 3. Given data showing that tactile impairment is universally present and a cause of global self-regulatory delay in young children with autism, the rational means of addressing social delay in these children is to treat tactile impairment. The data presented here are evidence that such an approach is effective.

The cause and specific nature of tactile impairment in autism is unknown. A full neurological evaluation of the sense of touch in young children with autism has not been published, and the sense of touch is not proven to be intact.[6] We have previously reported[4,7] that clinical signs of hypoesthesia and allodynia in young children with autism are compatible with multifocal tactile impairment due to sensory neuropathy. Whether or not this is the case, is under investigation. Should it be shown that children with autism have sensory neuropathy, it will be of interest to the massage community that sensory neuropathy is treatable with qigong massage, and will have implications for treating adults with sensory neuropathy.

The natural conclusion of this paper—that treatment of tactile impairment reduces severity of autism in pre-school children—is currently under definitive investigation with a large, three-year, randomized controlled trial (http://www.clinicaltrials.gov, #NCT0180169). Results will be available by the end of 2014. The results reported here show that tactile impairment is a treatable cause of self-regulatory delay in autism, and provide an explanation for the results of our two small, randomized controlled trials (n=46, n=47) showing medium and large effect reductions in severity of autism following five months of qigong massage treatment.[18,19]

Our research has implications for treating self-regulatory difficulties in other groups of children, as well. Many studies report that parent touch and massage stimulate early self-regulation in preterm and term infants. Specific improvements include foundational milestones relative to sleep, digestion, self-soothing, and orientation/attention.[22,23,24,25] To our knowledge, this paper is the first to show that massage can improve emotional and behavioral self-regulation in pre-school aged children, as well as difficulties with earlier self-regulation milestones relative to sleep, digestion, self-soothing, and attention. There is a very large group of preschool children with self-regulatory difficulties characterized by difficult-to-manage anxiety, aggression, prolonged tantrums, self-injurious behavior, and other behavioral symptoms, for which little treatment is available.[26] These children also have difficulties with earlier milestones, and this research suggests that massage may be a promising treatment avenue for this group.

The main limitation to this study is in the use of a retrospective study design to investigate treatment effect on tactile abnormalities. This limitation is mitigated in part by two previous studies reporting improvement of sensory abnormalities as a whole using randomized controlled design.[18,19] As mentioned above, a larger, longer-term prospective RCT is currently underway to address this limitation.

CONCLUSION

This study demonstrates that tactile impairment in young children with autism is treatable with a qigong massage protocol. The direct relationship between tactile impairment and self-regulatory delay pretreatment, and the proportional decrease of both posttreatment, suggest that tactile impairment is a cause of the self-regulatory delay in autism, and that qigong massage represents a promising avenue to improve developmental outcomes for young children with autism.

SUPPLEMENTARY MATERIALS

Appendix A: Movement Chart
Appendix B: QST Sense and Self-regulation Checklist

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CONFLICT OF INTEREST NOTIFICATION

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