

Mindfulness-Based Positive Behavior Support (MBPBS) for Mothers of Adolescents with Autism Spectrum Disorder: Effects on Adolescents' Behavior and Parental Stress

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Abstract Some parents have to deal with the challenging behaviors of their children with autism spectrum disorder (ASD), including aggressive and destructive behaviors. While pharmacological and behavioral interventions have been the treatments of choice, sometimes the pharmacological treatments are not very effective or the behavioral interventions are so labor intensive that parents fail to implement them consistently, thus leading to treatment failure and parental stress. In this proof-of-concept study, we assessed the effects of providing mindfulness-based positive behavior support (MBPBS) training to three mothers on the challenging and compliance behaviors of their adolescents with ASD. The

MBPBS program included a series of meditations aimed at personal transformation during an 8-week program. The training in mindfulness-based practices was paired with applications to their interactions with their adolescent children using a positive behavior support model, whereby the mothers learned how to apply behavioral contingencies with intuitive awareness. Results showed that the adolescents' challenging behaviors decreased and compliance behaviors increased commensurate with the mothers' training in MBPBS. In addition, statistically significant reductions in the mothers' stress levels were correlated with the MBPBS training. These findings provide initial support for MBPBS in assisting parents to effectively manage the challenging behaviors of their children with ASD and in increasing their positive social interactions with them, but without raising their own stress levels.

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Introduction

Children and adolescents with autism spectrum disorders (ASD) may present their parents with a number of challenges, most notably aggressive and destructive behaviors (Kanne and Mazurek 2011; Matson and Nebel-Schwalm 2007). It has been hypothesized that aggressive and destructive behaviors of individuals with ASD may be caused by frustration due to their communication deficits (Simpson and Myles 1998), underdeveloped theory of mind (Dominick, Davis, Lainhart, Tager-Flusberg, and Folstein 2007), faulty emotion regulation, or faulty control mechanism for expressing anger (Attwood 2008). It might also be that these behaviors could be an expression of underlying psychiatric conditions, such as mood

disorder or anxiety, which are often comorbid with ASD. If untreated, these behaviors can become more severe with time, interfere with the individuals' learning and socialization, result in ostracism at school, and impede their full participation in the community (Horner, Carr, Strain, Todd, and Reed 2002). Indeed, research suggests that up to 68 % of individuals with ASD engage in aggressive behavior at some point during their lifetime (Lecavalier 2006), thus making its effective treatment imperative.

Parents often resort to pharmacological interventions as a default treatment for their children's aggression when other approaches have proven ineffective or when they are unable to consistently implement more labor-intensive procedures (Singh, Lancioni, Winton, and Singh 2011a). The antipsychotics and selected antidepressants appear to offer some promise in treating aggression in individuals with ASD (Chavez, Chavez-Brown, and Rey 2006; Malone and Waheed 2009; Stachnik and Nunn-Thompson 2007). Even within these two drug classes, extant research suggests that only one typical antipsychotic (i.e., haloperidol), six atypical antipsychotics (i.e., risperidone, olanzapine, quetiapine, clozapine, ziprasidone, and aripiprazole), and three antidepressants (i.e., fluvoxamine, fluoxetine, and sertraline) have proven to be somewhat effective in treating aggression in this population (Singh et al. 2011a).

Parents of children with intellectual and developmental disabilities are often advised to use behavior analysis strategies to manage the challenging behaviors of their children (Carr 2007; Lucyshyn, Dunlap, and Albin 2002). While a number of antecedent and contingency management strategies have proven to be effective for managing aggressive behavior of individuals with disabilities, far fewer studies attest to their effectiveness with individuals with ASD (Singh et al. 2011a). Furthermore, many parents find behavior analysis strategies very time consuming and stressful to implement. Indeed, parents that we have worked with have indicated that their stress level escalates when behavior analysts ask them to engage in intensive therapies with their child. They note that family task demands are such that even though they know how to apply behavioral contingencies, they find it difficult to do so when they are stressed, and their child's behavior becomes more challenging, which in turn raises their stress level even further (cf. Hastings 2002).

When other stress-related factors are accounted for, the mere presence of aggression in a child with ASD is strongly correlated to parental stress (Gupta and Singhal 2005). This parental stress is above and beyond the stress parents of children with ASD experience when compared to parents in the general population as well as those that have children with other disabilities (Estes et al. 2009). Challenging behaviors (e.g., aggression, physical and verbal disruption, and property destruction) are a likely contributing factor to additional stress in these parents, because the severity of such behaviors is

highest among children and adolescents with ASD (Brereton, Tonge, and Einfeld 2006; Estes et al. 2009). Furthermore, there is some evidence to suggest that there is a bi-directional relationship between the children's challenging behaviors and parental stress (Lecavalier, Leone, and Wiltz 2006; McGrath 2013; Neece, Green, and Baker 2012).

For several decades, we have been working with parents whom we taught to use contingency management techniques for managing the challenging behaviors of their children with intellectual and developmental disabilities. Although effective, we found that adding mindfulness-based training to their existing behavioral knowledge produces not only clear and measurable positive changes in their children's challenging behaviors but also a decrease in parental stress (see Myers, Winton, Lancioni, and Singh 2014 for a review). For example, Singh et al. (2006) provided a 12-week mindfulness-based course to three parents of children with autism and assessed the outcome of the training on their children's behavior. All three parents had previously been taught contingency management procedures to manage their children's challenging behaviors, but had not been very successful. Results showed that with mindful parenting, there was a sustained decrease in their children's aggression, non-compliance, and self-injury and an increase in the mothers' satisfaction with their parenting and interactions with their children. These findings were replicated in a similar study with four parents of children with developmental disabilities, with the addition that parental stress was greatly reduced with training in mindful parenting (Singh et al. 2007).

In the present study, we were interested in evaluating the effectiveness of mindfulness-based training paired with a focus on its applications to positive behavior support (PBS) that was designed to produce personal transformation in the parents of adolescents with ASD. Thus, unlike our previous studies, the present study was designed specifically to integrate the meditations and visualizations with applications to PBS. Our assumption was that as mindfulness training progressed, the parents' ability to intuitively use mindfulness and behavioral skills with their adolescents' challenging behaviors would result in less effortful behavioral control (Bluth and Wahler 2011; Singh et al. 2010a, Singh et al. 2010b; Williams and Wahler 2010), thereby developing a more positive transactional trajectory with their adolescents.

Method

Participants

Three mother-adolescent dyads participated in this study. The mothers were referred by their child's support coordinators for mindfulness training due to the increasing stress experienced by the mothers. The mothers were the primary caregivers and

available for the training. Due to work commitments, the fathers could not participate in the mindfulness training, but agreed to be trained as secondary data collectors for inter-rater agreements. Each of the mothers had an adolescent diagnosed with Asperger syndrome and a history of working with behavior analysts in developing and implementing behavioral programs for the challenging behaviors of her child. However, each had given up using behavioral programs for at least the previous 2 years because of the added stress due to the consistent implementation of the procedures on a daily basis. None of the adolescents was on psychoactive medication prior to or during the study.

In the first dyad, the mother was 43 years old, college-educated, and had three other children without disabilities; a girl, 12 years old and two boys, 16 and 19 years old. The adolescent with ASD, Anitya (all names are pseudonyms), was a 15-year-old boy who received regular education at a private high school. In the second dyad, the mother was 37 years old, with a high school education, and had one other child without disabilities; a girl aged 11. The adolescent with ASD, Arjun, was a 16-year-old boy who received regular education at the local public high school. In the third dyad, the mother was 41 years old, with primary school education, and had one other child without disabilities; a boy aged 13. The adolescent with ASD, Arvind, was a 19-year-old boy who received regular education at the local public high school. The adolescents had exhibited challenging behaviors when they were 3 or 4 years old and had a history of such behaviors across settings (e.g., home, school, and community).

Objective Measures—Target Behaviors, Recording Procedures, and Inter-Rater Agreements

The following three behaviors of the adolescents with ASD were targeted: incidents of aggression, incidents of disruptive behavior, and compliance with mother's requests. Aggression was defined as any of these behaviors directed at the mother or a sibling: hitting, biting, kicking, and slapping. Disruptive behaviors were defined as acts that negatively affected the family's social interactions, including pushing, shoving, inordinate or inappropriate demands for time or attention, creating excessive noise, offensive verbal comments, performing distracting repetitive acts during social interactions, and other idiosyncratic behaviors identified by the mothers of the adolescents in this study. Compliance was defined as the adolescent responding to his mother's requests in a socially appropriate manner within an acceptable timeframe that was determined by each mother.

Data were collected at all times when each adolescent was at home and in the presence of his mother, which could vary from a few hours each school day to several hours during the weekends. Each mother collected data on her son's behaviors

using an iPhone App that enabled recording of multiple events in real time during the three phases of the study as follows: baseline, mindfulness-based positive behavior support training (MBPBS), and MBPBS practice.

The fathers served as reliability raters, collecting data on their son's behaviors using the same system as the mothers, but on their own iPhones, for an average of 3 h each week, typically in the evenings or weekends. An agreement was defined as both the mother and father recording an instance of aggression at about the same time (i.e., within ± 5 s). Percent inter-rater agreement was calculated for each week by dividing the total number of agreements by the total number of observations made by the primary observer (the mother) and multiplying by 100. The inter-rater agreement for all observations with both parents present ranged from 87 to 100 %, with a mean of approximately 93 %.

Subjective Measures—Mother's Stress and Informal Parent Interviews

The mothers' perception of their stress was measured on the Perceived Stress Scale-10 (PSS-10; Cohen, Kamarck, and Mermelstein 1983) four times as follows: pre-baseline (prior to beginning the Samatha meditation), first day of baseline, last day of MBPBS training, and last day of MBPBS practice. The PSS-10 provides an index of the degree to which people perceive their lives as stressful and indicates how often they have found their lives to be unpredictable, uncontrollable, and overloaded in the last month. The mothers responded to 10 questions on a five-point scale, ranging from 0 (never) to 4 (very often). Responses are summed to create a psychological stress score, with higher scores indicating greater psychological stress. The PSS-10 has adequate psychometric characteristics (Cohen and Williamson 1988).

During the last week of the mindfulness practice phase, we informally interviewed the mothers regarding their mindfulness-based practices and perceived outcomes of participation in the MBPBS program. The interviews focused on three key issues that included daily meditation practice, the MBPBS program, and personal growth.

Experimental Design

We used a multiple baseline design across participants (Barlow, Nock, and Hersen 2009), with three phases as follows: baseline, mindfulness training, and mindfulness practice. This design was chosen because it enabled us to undertake a rigorous proof-of-concept study of a new mindfulness-based training program without subjecting a large number of participants to the training in the absence of an evidence base. The design provides a methodology for demonstrating experimental control with as few as three participants when the hypothesized change in the dependent variable systematically

covaries with the introduction of the independent variable (Barlow et al. 2009).

A month prior to the beginning of baseline, the three mothers were taught the basic Samatha meditation during a 2-h individual pre-training session. Each mother received instructions on the fundamentals of meditation posture: sit comfortably with a straight spine, without slouching or stretching the shoulders; head tilted slightly forward; eyes slightly open; tip of the tongue lightly touching the upper palate; right hand resting over the left hand on the lap, with thumbs just touching; and breathing evenly (Buksbazen 2002). They were taught to focus on their breathing, without deliberately changing the length of each breath. They learned to count inhalation and exhalation as one breath until they reached 10 breaths before restarting the counting cycle. They were taught to simply observe their discursive thoughts and emotions, without paying attention to them or trying to suppress them. That is, they were required to focus their awareness on whatever took place in their mind without judgment or engagement. In addition, the mothers were taught Kinhin and insight meditations (Buksbazen 2002; McDonald 2005). Following the pre-training, they were instructed to develop a personal meditation practice, beginning with a few minutes each day and incrementally increasing it until they reached between 20 and 30 min of daily practice.

Baseline By the beginning of the baseline phase, each mother had practiced the three foundational meditations (i.e., Samatha, Kinhin, and insight) daily for 4 weeks and was required to continue with these meditations during this phase. No training or programmed intervention was introduced during this phase. The mothers were instructed to continue whatever parenting techniques they used before the initiation of this study. Baseline was in effect for 3, 5, and 8 weeks for the mothers of Anitya, Arjun, and Arvind, respectively. The mothers were also taught to collect data on their child's behaviors—aggression, disruptive behaviors, and compliance to their requests.

MBPBS Training The MBPBS training phase consisted of 1-day trainings a week, for 8 weeks, and involved one-on-one training by the trainer, provided to each mother individually. The training included instruction on the four immeasurables (loving-kindness, compassion, joy, and equanimity), the three poisons (attachment, anger, and ignorance), Shenpa and compassionate abiding, and meditation on the soles of the feet (Chödrön 2007, 2010; Kongtrül 2008; Kyabgon 2004; Singh, Singh, Singh, Singh, and Winton 2011b). The mothers were knowledgeable of standard principles and techniques of PBS because of previous histories of training and practice in PBS by their behavior analysts (Hieneman, Childs, and Sergay 2006). The mothers had been taught the basics of PBS procedures when their children were between 6 and 8 years of age,

and they had been intermittently trained on specific behavioral interventions by their behavior analysts since then. Throughout the MBPBS training, they were taught how to use PBS within the context of mindfulness practices. From the second week of training, they were required to practice with their children what they had learned in the previous week(s), thus making their practice of MBPBS cumulative as the training progressed through the MBPBS program. In addition, they were taught to apply their newly learned MBPBS skills in their interactions with their adolescent with ASD. The eight-session MBPBS program and the structure of each training session (including the pre-training session) are presented in Table 1.

MBPBS Practice This phase immediately followed the MBPBS training phase and lasted until week 48 of the study for each mother. The mothers were requested to continue with all meditation practices they had learned in the MBPBS training phase and to mindfully utilize the PBS techniques in their interactions with their children, but particularly with the adolescent with ASD. They were given no further instructions in mindfulness, but any questions they had about the mindfulness-based practices and the PBS techniques were fully answered.

Training Adherence

We recorded attendance of the mothers at the training sessions, and each mother completed daily logs of meditation practices from pre-training to the end of the MBPBS practice phase. All three mothers attended all training sessions. The daily logs showed that the three mothers were very diligent in their meditation practice. On average, they engaged in 5 to 10 min of meditation practice, first thing in the morning, every day during the first week of pre-training. They gradually increased their meditation sessions until they were sitting, using the Burmese posture (Buksbazen 2002), for 30 to 40 min a day by the end of the MBPBS training phase. They were able to maintain and increase their daily meditations up to an hour each day by the end of MBPBS practice phase. On average, the mothers sat for 93 % of the days during the MBPBS practice phase, for between 45 and 60 min.

Trainer

A single person provided training to all three mothers. This trainer had a 40-year personal meditation practice, clinical expertise, and experience in mindful delivery of services in behavioral health. Training was provided individually to each mother. Teaching sessions were videotaped, and six randomly chosen sessions, stratified by mothers, were assessed for fidelity of training by another qualified mindfulness trainer. The fidelity of mindfulness training was rated at 100 %.

Table 1 Outline of the MBPBS Program

Training sessions	Topics covered
Pre-training: basic meditations (4 weeks prior to baseline)	<ul style="list-style-type: none"> • What is mindfulness? • Everyday mindfulness • Samatha meditation • Kinhin meditation • Insight meditation • Practice: Samatha, Kinhin, and insight meditations
Week I	<ul style="list-style-type: none"> • Review of pre-training practices • Samatha, Kinhin, and insight meditations • The five hindrances to meditation • The four foundations of insight • The four immeasurables • Beginner's mind, premature cognitive commitment, confirmation bias • Applications of mindfulness training to PBS • Practice: journaling and meditation practices
Week II	<ul style="list-style-type: none"> • Review of week I and meditation practices • Samatha, Kinhin, and insight meditations • Equanimity visualization • Being in the present moment • Applications of mindfulness training to PBS • Practice: journaling and meditation practices
Week III	<ul style="list-style-type: none"> • Review of week II and meditation practices • Samatha, Kinhin, and insight meditations • Equanimity visualization • Loving-kindness visualization • The three poisons: attachment, anger, and ignorance • Applications of mindfulness training to PBS • Practice: journaling and meditation practices
Week IV	<ul style="list-style-type: none"> • Review of week III and meditation practices • Samatha, Kinhin, and insight meditations • Equanimity and loving-kindness visualizations • Compassion visualization • Discussion of anger • Applications of mindfulness training to PBS • Practice: journaling and meditation practices
Week V	<ul style="list-style-type: none"> • Review of week IV and meditation practices • Samatha, Kinhin, and insight meditations • Equanimity, loving-kindness, and compassion visualizations • Joy visualization • Applications of mindfulness training to PBS • Practice: journaling and meditation practices
Week VI	<ul style="list-style-type: none"> • Review of week V and meditation practices • Samatha, Kinhin, and insight meditations • Equanimity, loving-kindness, compassion, and joy visualizations • Shenpa • Shenpa meditation and compassionate abiding • Applications of mindfulness training to PBS • Practice: journaling and meditation practice
Week VII	<ul style="list-style-type: none"> • Review of week VI and meditation practices • Samatha, Kinhin, and insight meditations • Equanimity, loving-kindness, compassion, and joy visualizations • Compassionate abiding • Compassionate abiding meditation • Applications of mindfulness training to PBS • Practice: journaling and meditation practices
Week VIII	<ul style="list-style-type: none"> • Review of week VII and meditation practices • Equanimity, loving-kindness, compassion, and joy visualizations

Table 1 (continued)

Training sessions	Topics covered
	<ul style="list-style-type: none"> • Shenpa and compassionate abiding • Anger: meditation on the soles of the feet • Mindfulness and PBS: putting it all together • Review of the MBPBS course and arrangements for individual follow-up interviews • Post-course interviews

Data Analyses

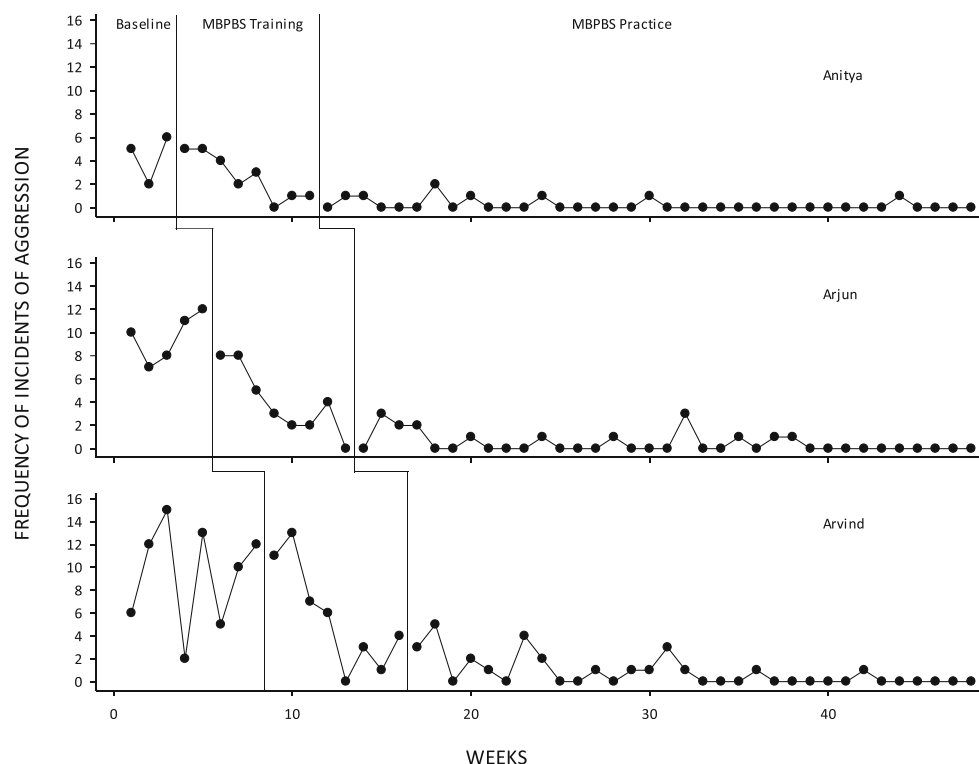
As is common in single-subject and multiple baseline designs, figures depicting change in target behaviors across each phase of intervention are presented. Due to limitations of visual analyses of these graphs (see Parker, Hagan-Burke, and Vannest 2007), change from baseline to study completion was quantified. Specifically, we present the Phi coefficient effect size and corresponding p value for each target behavior. Phi, calculated based on procedures illustrated by Parker and colleagues (e.g., Parker et al. 2007; Parker and Vannest 2009), offers a numeric value that represents the extent to which data from the baseline and mindfulness practice phases overlap. When there is no overlap across phases, $\Phi=1.00$. When there is complete overlap across the phases, $\Phi=0.00$. The associated p value represents the probability that the obtained results are due to chance.

We analyzed the interview data using the Interpretative Phenomenological Analysis method (IPA; Smith, Flowers, and Larkin 2009). This data analysis method was used because it offers the possibility of analyzing qualitative data from very small samples to gain insight into the lived experience of the participants. The IPA was considered particularly appropriate given only three participants and the preliminary nature of the data. Furthermore, because the IPA does not lend itself to hypothesis testing, codes are generated from the data, and patterns or themes are searched in the codes. It is assumed that these themes identify what is important to the participants and their meaning to the participants (Smith et al. 2009).

Results

The frequency of aggressive incidents per week during baseline, MBPBS training phase, and MBPBS practice phase for each adolescent is presented in Fig. 1. During baseline, Anitya, Arjun, and Arvind engaged in an average of 4.33, 9.60, and 9.36 aggressive incidents per week, respectively. During the MBPBS training phase, the mean frequency of aggressive incidents per week was 2.63, 4.00, and 5.63, respectively. During the MBPBS practice phase, the mean frequency of aggressive incidents per week was 0.22, 0.46, and

Fig. 1 Frequency of aggressive incidents per week during each week of baseline, MBPBS training and MBPBS practice



0.81, respectively. The downward trend in aggressive incidents per week illustrated in Fig. 1 was statistically significant, $\Phi=0.76$, $p<0.001$.

The frequency of disruptive behavior incidents per week during baseline, MBPBS training phase, and MBPBS practice phase for each adolescent is presented in Fig. 2. During baseline, Anitya, Arjun, and Arvind engaged in an average of 15.00, 41.60, and 43.38 disruptive behaviors per week, respectively. During the MBPBS training phase, the mean frequency of disruptive behaviors per week was 7.63, 27.38, and 29.50, respectively. During the MBPBS practice phase, the mean frequency of disruptive behaviors per week was 1.03, 3.80, and 5.75, respectively. The downward trend in disruptive behaviors per week illustrated in Fig. 2 was statistically significant, $\Phi=0.93$, $p<0.001$.

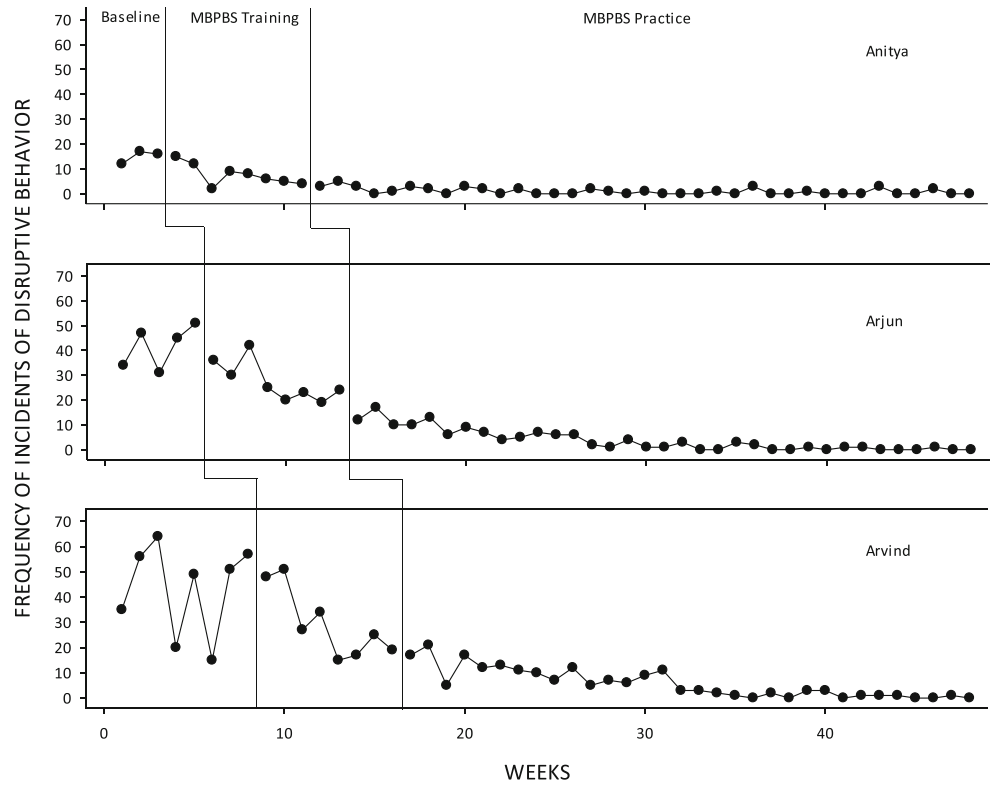
The mean percent of compliance with mother's requests per week during baseline, MBPBS training phase, and MBPBS practice phase for each adolescent is presented in Fig. 3. During baseline, mean compliance per week for Anitya, Arjun, and Arvind was 14.33, 38.60, and 30.88 %, respectively. During the MBPBS training phase, mean compliance per week was 26.38, 44.5, and 45.13 %, respectively. During the MBPBS practice phase, the mean compliance per week was 60.41, 73.11, and 77.16 %, respectively. The upward trend in compliance percentage per week illustrated in Fig. 3 was statistically significant, $\Phi=0.86$, $p<0.001$.

The mothers' perceived stress ratings are presented in Table 2. Even though there were only three participants, we conducted a repeated measures ANOVA to determine if the

within participant changes in reported stress were statistically significant. The results were significant, $F(3, 6)=31.19$, $p<0.01$. Statistical significance was obtained with such a small sample size due to the large effect size (partial eta squared=0.94).

In informal interviews, the mothers spoke about their daily meditation practice, the MBPBS program, and personal transformation. In terms of their meditation practice, they found the basic meditations (Samatha, Kinhin, and Insight) to be exhilarating because they were highly motivated, and the practice enabled them to be calmer, more centered, and aware of the present moment. Practicing these meditations gave them hope that the stresses and strains of family life with their children with ASD would gradually subside. They tempered their enthusiasm following the introduction of the 8-week MBPBS course because of the additional meditation practices they needed to learn and practice. For example, each of the four immeasurables included successive, stepwise, visualizations that each of the mothers initially found difficult to do. But, as the weeks progressed, the mothers stabilized their meditation routines and noted that slowly the visualizations became more of a routine practice. They found the concept of Shenpa somewhat difficult to grasp, but once they understood it as a method of gaining insight into their own behavior, they delved deeper into its practice, coupled with compassionate abiding meditation. They found the meditation on the soles of the feet, the final meditation in the series of meditations, to be relatively easy to understand and practice because it is an application of the Samatha meditation where the focus of

Fig. 2 Frequency of disruptive behavior incidents per week during each week of baseline, MBPBS training and MBPBS practice



one's attention is the key practice. By the end of the 8 weeks of training, all three mothers noted that they had developed a disciplined meditation practice that was firm and unwavering.

In terms of their perceptions of the MBPBS program itself, the mothers noted that they were a little skeptical, but open-minded about the anticipated outcomes. The genesis of the

Fig. 3 Mean percent of compliance with mother's requests per week during each week of baseline, MBPBS training and MBPBS practice

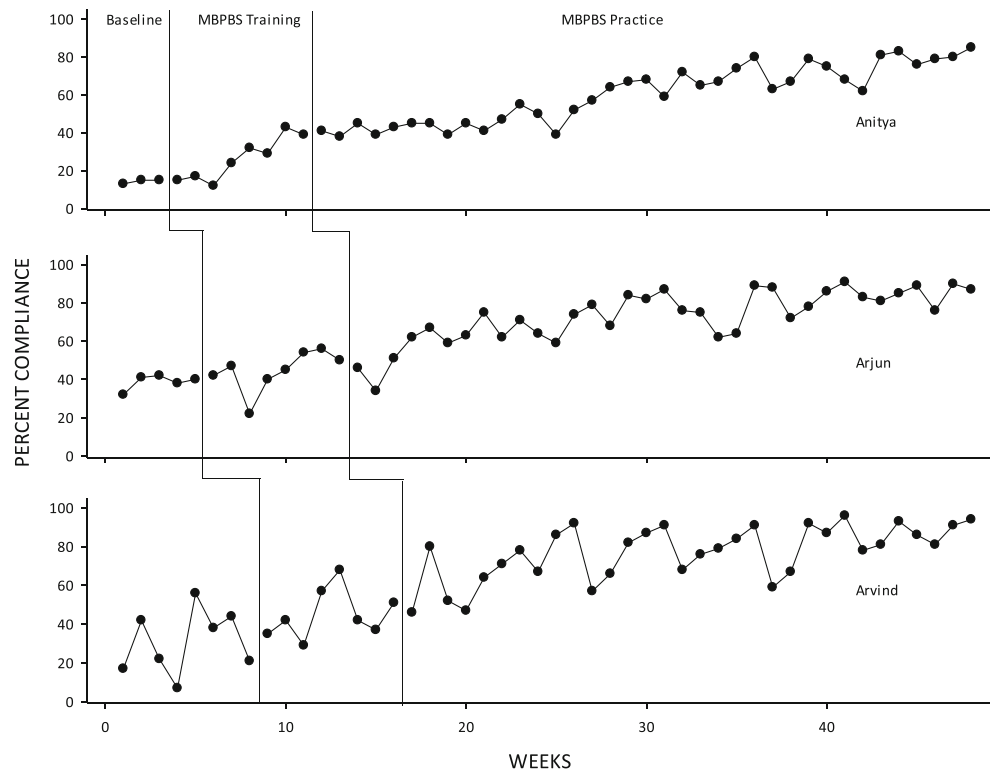


Table 2 Mothers' perceived stress scale ratings during pre-baseline, baseline, MBPBS training, and MBPBS practice

	Mother 1	Mother 2	Mother 3
Pre-baseline	29	37	34
Baseline	22	28	30
MBPBS training	18	24	29
MBPBS practice	14	15	17

For the PSS-10, higher scores indicate greater psychological stress

skepticism was in the notion that they would be able to manage their children's aggressive and disruptive behaviors more effectively, but with less stress, and without guidance from written positive behavior support plans. As they progressed with their meditation practice following the MBPBS training, they noticed incremental changes in their relationship with their children with ASD, as well as with other members of their families. The adolescents became less aggressive and disruptive, and they responded more positively towards their mothers. They responded well to their mother's requests, but not to all of their requests. The mothers noted their stress decreasing as their children's challenging behaviors decreased and compliance increased. The mothers uniformly reported that they had previously experienced an enormous amount of stress in implementing programmed behavioral interventions for two related reasons. First, they had found implementing the behavior plans developed by the behavior analysts to be just too technical—requiring the use of different procedures under different conditions—and too labor intensive. Second, they believed that applying the strict contingencies required in the behavior plans increasingly resulted in negative interactions with their children, which in turn affected their general mother-son relationship. The mothers noted that the MBPBS program enabled them to respond to their children's behavior with measured calmness and apply behavioral contingencies with mindfulness awareness of the causes and conditions that may have given rise to their behavior. Furthermore, they reported that they were able to respond appropriately to their children's aggression and disruptive behaviors with a calm presence of mind, using skillful means (i.e., *upaya*), but without necessarily remembering or working out what behavioral contingencies to apply. The stress of implementing behavior plans disappeared.

The mothers again uniformly observed that beginning with the basic meditations, they noted incremental changes in their own behavior and well-being. Furthermore, they said that others—family members, friends, and colleagues at work—also observed these changes in them and made a point of asking how these came about. The mothers became less stressed, were warmer in their interactions and relationships, exuded calmness during situations that previously would have induced stress, and stated that they experienced more joy in

their lives. They noted that the practice of the four immeasurables had the greatest impact on their relationship with themselves as well as other sentient beings, as stressed in the course. The Insight meditation, Shenpa, and compassionate abiding helped them to better understand themselves as well as those they interacted with. The meditation on the soles of the feet provided them with a tool for exerting inner control of rising anger and angst during their rare occurrences. Overall, the mothers fully believed and began experiencing the teaching that life is as it is and that to live by skillful means in the present moment reduces the attachments they have to their thoughts, feelings, and perceptions.

Discussion

We investigated whether training mothers in a MBPBS course, designed to encourage personal transformation, would result in changes in the behaviors of their adolescents with ASD without the use of programmed interventions. Our results showed that, commensurate with the mothers' training in MBPBS, their adolescents' aggressive and disruptive behaviors began decreasing and showed further clinically and statistically significant reductions during the mindfulness practice phase that followed the training. Furthermore, the adolescents' compliance with mothers' requests showed the inverse: compliance began increasing during the MBPBS training phase, with further clinically and statistically significant increases during the MBPBS practice phase. Furthermore, we found statistically significant reductions in the mothers' stress levels with training on the MBPBS program.

These findings confirm and extend previous research that shows teaching mindfulness-based practices to parents changes not only their own behavior but also that of their children. In an early study, Singh et al. (2006) showed that when parents of children with ASD were trained on a 12-week mindfulness program, significant reductions resulted in their children's aggression, self-injury, and non-compliance. Singh et al. (2007) replicated and extended these findings with parents of children with developmental disabilities. In this study, the mindfulness-based training of the parents was correlated with significant reductions in the aggressive behavior of their children. In addition, the children's positive social interactions with their siblings increased, and negative interactions decreased. Furthermore, the mindfulness-based training was associated with a significant decrease in the parents' stress levels. In addition, these findings were replicated with parents of children with attention deficit hyperactivity disorder (Singh et al. 2010b). In a more recent study, Neece (2014) showed that when parents participated in an 8-week course of the standard mindfulness-based stress reduction (MBSR) program (Kabat-Zinn 1990), their children's attention problems were reduced. Bögels, Hellems, van Deursen, Römer, and

Meulen (2013) showed that mindfulness-based parenting resulted in improvements in the children's internalizing and externalizing symptoms.

When compared to parents of typically developing children, parents of children with ASD face considerably more parenting stress, especially if their children engage in challenging behaviors (Jones, Hastings, Totsika, Keane, and Rhule 2014; Schieve, Blumberg, Rice, Visser, and Boyle 2007; Totsika, Hastings, Emerson, Berridge, and Lancaster 2011). Indeed, there is some evidence that suggests parents of children with ASD may face up to four times the stress that parents of typically developing children experience (Silva and Schalock 2012). Thus, training parents to effectively manage the challenging behaviors of their children with ASD may provide one approach to reducing their stress levels. A review of the parent training literature for parents of children with ASD noted that the best programs were firmly rooted in the behavior analytic framework (Matson, Mahan, and Matson 2009), but none of the studies reviewed investigated the effects of parent training on the stress levels of the parents before and after training. However, Bluth, Roberson, Billen, and Sams (2013) have developed a stress model that suggests that mindful parenting may be an alternative to behavioral training for reducing stress in parents of children with ASD.

A few studies have shown that parents who engage in mindful parenting report lower perceived stress as a result of mindfulness-based training. For example, parents of children with developmental disabilities reported much reduced parental stress following a 12-week mindfulness-based parent training program (Singh et al. 2007). Recently, findings from Neece's (2014) quasi-experimental study indicated that parents of young children with developmental disabilities who completed the standard 8-week MBSR course reported decreased parental stress. The present study provides confirmatory evidence that stress can be reduced in parents of adolescents with ASD through an 8-week MBPBS program. Given that these three studies used different mindfulness components in their mindful parenting programs attests to the generality of mindfulness-based approaches to personal transformation that leads to stress reduction.

PBS has a strong evidence base as a technology for socially validated behavior change, and it is probably the most widely used approach in the field of intellectual and developmental disabilities (Carr 2007; Carr et al. 2002; Sailor, Dunlap, Sugai, and Horner 2009). However, parents of children and adolescents with developmental disabilities often drop out of behavioral training programs and do not consistently use PBS interventions with their children because of increasing stress, decreasing motivation, and suffering from implementation fatigue due to slow arrival of positive effects. This has resulted in the pairing of PBS with additional technologies to enhance effectiveness of PBS procedures. For example,

Durand, Hieneman, Clarke, Wang, and Rinaldi (2012) reported a randomized clinical trial that assessed the effects of PBS alone and combined with a cognitive behavioral intervention—positive family intervention (PFI). They were interested in assessing the comparative effectiveness of the two approaches in enhancing parents' ability to implement PBS for enhanced child outcomes. While both approaches were effective, the PFI was comparatively more effective in terms of reductions in both child problem behavior and pessimism in the parents.

The MBPBS program followed a similar logic as that presented by Durand et al. (2012). However, the focus was somewhat different in that the basic training was in mindfulness, with added instructions in PBS and how to mindfully use PBS in practice. Our results show that, when compared to baseline, MBPBS was very effective in producing behavior change in the adolescents as well as in reducing parental stress. These mothers were able to change their transactions with their adolescents such that the adolescents' aggressive and destructive behaviors decreased substantially, and compliance to parental requests increased significantly. These changes resulted even in the absence of programmed behavioral contingencies in terms of written behavior plans derived from functional analyses of the adolescents' challenging behaviors.

Informal interviews with the mothers indicated that the MBPBS training was well received, and they felt it made a difference in their lives, both in terms of personal transformation and in their interactions with their adolescents. They reported reduced stress due to the positive changes in the bi-directional interactions with their adolescents. Furthermore, they were able to modify their own behavior as well as witness positive changes in their adolescents' challenging behaviors without the angst and stress involved in constantly implementing contingencies developed by a behavior analyst. The mothers were able to support and manage their adolescents' behavior in a calm and positive manner. All three mothers noted that what they noticed most about themselves was the inner transformation that occurred which enabled them to respond to their children with calm awareness of the needs of the adolescents.

One obvious question is what changed in the mothers that enabled them to alter the negative trajectory of their interactions with their adolescents? Although we did not aim to tease out the mechanisms involved in the behavior change, we suspect that the changes generally experienced and reported by meditators occurred to varying degrees in the mothers in this study (see Hölzel et al. 2011; Singh 2014a). For example, the Samatha meditation enabled them to learn how to achieve a calm state of mind that is not easily perturbed by purportedly negative events and social interactions. The insight meditation enabled them to

gain a better understanding of the nature of reality, based on the four foundations of mindfulness. Furthermore, the practice of insight meditation enabled them to begin seeing how their thoughts, feelings, and perceptions, as well as mental attitudes, create and shape their very being. As they gained increasing insight of the workings of their minds, they were more attentive to their intentions and attitudes than just to their actions or behaviors. The meditation on the four immeasurables helped with their personal transformation, and other meditations (e.g., Shenpa, compassionate abiding, and soles of the feet) helped them gain further insight into the arising of their thoughts, feeling, and perceptions.

We suspect that the transformation in the mothers is behaviorally manifested in their interactions with their adolescents, which become increasingly positive and less effortful (Bluth and Wahler 2011). The adolescents detect this change and align their responses with the valence of their mother's response. Thus, an informal matching occurs—as the mother's responses begin to be more positive, the adolescents respond more positively to the mothers—and this gradually changes the transactional pathway from negative to positive (Sameroff 1995). The behaviors of the mothers act as motivating operations by affecting the likelihood of increasingly positive behaviors of their adolescents, and vice versa (Laraway, Snyckerski, Michael, and Poling 2003). Until experimental verification, we speculate that mindfulness training enables mothers to intuit the changing behavioral contingencies and respond appropriately without the need for a written PBS plan to guide them. This intuitive awareness (i.e., *sati-sampajañña* or clear comprehension) arises with consistent practice of insight meditation (Giommi and Barendregt 2014).

Another question is why the present study did not use the standard MBSR program that was designed specifically to reduce stress. The MBSR program and its variants and extensions constitute the first generation of mindfulness-based approaches that were developed as secular interventions for ameliorating psychological and physical distress. They served a needed purpose in bringing mindfulness practices into the mainstream of Western practice. However, the field has grown in the last 30 years, and the approach we have taken in our present and previous studies (e.g., Singh, Lancioni, Winton, Karazsia, and Singh 2013; Singh et al. 2007) attests to the emergence of a second generation of mindfulness-based approaches. In addition to our work in this field, others have also adopted a second-generation approach to mindfulness-based interventions (e.g., Van Gordon, Shonin, Sumich, Sundin, and Griffiths 2013).

A key feature of the second-generation approaches is that the meditations aim to produce a personal transformation in the practitioner and are not focused solely on enhancing a person's health and wellness (see Singh 2014b; Suchday, Mayson, Klepper, Meyer, and Dziok 2014). Our mindfulness-based

approaches are firmly rooted in the Mahayana tradition of Buddhist practices and include meditations for spiritual transformation aimed at benefitting not only the practitioner but also all sentient beings. These approaches enable practitioners to gain wisdom, which arises from the realization that everything is interdependent—nothing has self-existence or is permanent, and there is no self-existing self. Thus, the intention and attitude of the practitioner is that the outcomes of one's practice of meditation is dedicated to the welfare of others and, by helping others, we help ourselves. This view has practical scientific implications as well. For example, if we are interdependent, it means that effects of one's meditation practice will affect not only the practitioner but also others. Thus, this means the impact of mindfulness-based programs can be measured in terms of the changes evident not only in the practitioner but also on others. This is the approach we have taken in a series of mindfulness-based training studies for parents that assess the impact of the training on their children and adolescents (see Myers et al. 2014). Furthermore, this approach avoids the current pitfalls associated with self-ratings of mindfulness by the practitioner (Grossman 2008; Grossman and Van Dam 2011).

In sum, the results of this proof of concept study are very promising. The study is limited by the sample size, use of a convenience sample of parents and their adolescents with ASD, and lack of follow-up data. However, the data are highly suggestive of the effectiveness of MBPBS in reducing parental stress as parents manage their adolescents' challenging behaviors.

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