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Adolescents with Asperger syndrome can use a mindfulness-based strategy to control their aggressive behavior

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ABSTRACT

Children and adolescents with Asperger syndrome occasionally exhibit aggressive behavior against peers and parents. In a multiple baseline design across subjects, three adolescents with Asperger syndrome were taught to use a mindfulness-based procedure called *Meditation on the Soles of the Feet* to control their physical aggression in the family home and during outings in the community. They were taught to shift the focus of their attention from the negative emotions that triggered their aggressive behavior to a neutral stimulus, the soles of their feet.

Prior to training in the mindfulness-based procedure the adolescents had moderate rates of aggression. During mindfulness practice, which lasted between 17 and 24 weeks, their mean rates of aggression per week decreased from 2.7, 2.5 and 3.2 to 0.9, 1.1, and 0.9, respectively, with no instances observed during the last 3 weeks of mindfulness practice. No episodes of physical aggression occurred during a 4-year follow-up. This study suggests that adolescents with Asperger syndrome may successfully use a mindfulness-based procedure to control their aggressive behavior.

1. Introduction

The prevalence of Asperger syndrome has been estimated to be between about 2 cases in 10,000 children (Fombonne, 2003) and 10 cases in 10,000 children (Saracino, Noseworthy, Steiman, Reisinger, & Fombonne, 2010). Individuals with Asperger syndrome generally have severe, sustained, functional impairment in social interaction, typically without a concomitant impairment in language, cognitive functioning, or age-appropriate activities (DSM-IV-TR; APA, 2000). In addition, they have at least two of the following clinical indications of qualitative social impairment: (1) markedly abnormal non-verbal communicative gestures; (2) failure to develop peer relationships; (3) lack of social or emotional reciprocity, and (4) an impaired ability to express pleasure in other people's happiness (APA, 2000). Neither a clear etiology nor risk factors for Asperger syndrome have been identified in the extant research literature (DM-ID; Fletcher, Loschen, Stavrakaki, & First, 2007). However, emerging research suggests adolescents and adults with Asperger syndrome may be at increased risk for psychiatric

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disorders, such as depression (Gilchrist et al., 2001; Tantam, 2003), psychosis (Kiln, Volkmar, & Sparrow, 2000), and bipolar disorder (Duggal, 2003), as well as for difficulties with the legal system (Allen et al., 2008; Baron-Cohen, 1988).

The prevalence of aggression in individuals with Asperger syndrome is unknown. However, there is sporadic reference in research journals, as well as in popular trade publications, of aggression occurring in this population at about the same prevalence as in the general population (Attwood, 2008). There has been some suggestion in the literature that, for some individuals with Asperger syndrome, aggression may be the result of "faulty emotion regulation or control mechanism for expressing anger" (Attwood, 2008). Other explanations that have been advanced to account for aggression in this population include the need to achieve some control over situational contexts—to meet personal preferences and choices (e.g., tangibles) and to avoid or escape from tasks or unpleasant situations. For some, aggression may mask other psychiatric conditions, such as mood disorder or anxiety, which are often comorbid with Asperger syndrome.

In a recent review of treatments for aggression in Autism Spectrum Disorders (ASD), Singh, Lancioni, Winton, and Singh (in press) reported the following with reference to individuals with Asperger syndrome: (1) a few case reports describing aggression and its treatment, but only in qualitative terms; (2) minimal literature on behavioral interventions for aggression; and (3) minimal literature on psychopharmacological interventions for aggression. One explanation for the paucity of treatment literature is that research studies typically utilize institutionalized populations, and individuals with Asperger syndrome invariably live in the community. A related reason is that aggression is a low rate behavior in most community populations, and rarely do people in the community seek interventions for anger or aggression.

There is a small but encouraging literature attesting to the feasibility of using a mindfulness-based intervention to treat aggression. The procedure, *Meditation on the Soles of the Feet* (SoF), has proven effective in treating aggression in individuals with intellectual disabilities and/or mental illness, adolescents with conduct disorder, forensic offenders with ID, and others with anger management problems (Singh, Lancioni, Winton, Adkins, et al., in press). In a recent study, we taught SoF to help three adolescents with autism so that they could self-manage their physical aggression (Singh, Lancioni, Manikam, et al., 2011). This procedure required the adolescents to rapidly shift the focus of their attention from the aggression-triggering event to a neutral place on their body, the soles of their feet. Across the three adolescents, the mean rates of aggression per week ranged from 14 to 20 during baseline and from 4 to 6 during mindfulness training, reaching zero during the last 4 weeks of intervention. No aggression occurred during the 1-year maintenance period, and only about 1 instance per year during a 3-year follow-up.

Given that adolescents with autism were able to learn and effectively use a mindfulness-based procedure to self-manage their physical aggression for several years, we suspected that adolescents with Asperger syndrome would be even more successful at using the procedure, because they do not have the cognitive disabilities typically associated with those who have autism. Thus, the aim of this study was to evaluate the effectiveness of SoF for three adolescents with Asperger syndrome to self-manage their aggressive behavior.

2. Method

2.1. Participants

Three adolescents with Asperger syndrome participated. All three had lived in the community with their parents, and had never been institutionalized. They attended their local schools, were in regular education classes, and did not receive any additional services because they had Asperger syndrome. However, their teachers and school psychologists had developed and implemented several behavioral interventions (e.g., tokens, differential reinforcement procedures, time out, reporting to the principal contingent on aggressive behavior) for their aggressive behavior, as they had for other children at the school who did not have Asperger syndrome. The adolescents had been on medication (i.e., new generation antipsychotics) at least once prior to enrolment in this study. None was on medication during the course of this study and follow-up. Their aggressive behaviors were minimal at school, and their teachers were well trained to manage the low incidence of aggression. The reason for enrollment in the study was because their parents were unable to manage their aggressive behaviors at home and during outings in the community.

John, a 15-year-old, had a history of being aggressive from the age of 2 years, and despite various treatments, including behavioral and psychopharmacological regimens, his behavior kept escalating at home until his parents were on the verge of seeking inpatient treatment. The topography of his aggression included hitting, kicking, biting, and scratching. Functional assessment suggested high rates for demand, escape, and avoidance. John had two siblings, a brother aged 13, and a sister aged 11 years.

Paul, a 13-year-old, had a 3-year history of aggressive behavior that appeared impulsive and full of rage. The topography of his aggression included hitting, kicking, slapping, scratching, and destroying property. Functional assessment indicated no clear motivation for his aggression. He had been treated with behavioral programs and medication, both having minimal long-term effectiveness. He was becoming unmanageable at home. Paul had a twin brother.

George, an 18-year-old adolescent, had a long history of aggressive behavior from the age of 4 years. The topography of his aggression was punching, hitting, and kicking. Functional assessment indicated no clear motivation but demands and avoidance were possibilities. He had been treated with behavioral procedures, restraints, and psychotropic medications, none with lasting effects. George had a 14-year-old brother.

2.2. Event and response definitions

We defined *physical aggression* as hitting, biting, scratching, punching, kicking, slapping, or destroying property. An *incident* was defined as an occasion that provided the setting event for physical aggression by an adolescent. This included any situation that would typically elicit or evoke the adolescent's aggressive behavior, as defined above. An instance of *self-control* was when an incident was judged to have occurred, but where the adolescent did not engage in any aggressive act. A *parent or sibling injury* was defined as an injury caused by the adolescent that required at least first aid treatment and was recorded by the parent or sibling.

2.3. Measurement and inter-rater agreement

Incidents, and whether they were followed by either physical aggression or self-control, were recorded by each adolescent on all occasions, and by parents and siblings during the times each day the adolescents were with them. Reliability of data collected was assessed by comparing the data of the parents against that of the siblings if both were present when an act of aggression occurred. This occurred 33%, 47%, and 42% of the time the parents were with John, Paul, and George, respectively, across baseline and all experimental conditions. An agreement was defined as both parents and siblings recording the same aggressive act as occurring at about the same time. Percentage of inter-rater agreement was calculated for the whole period of observation by dividing agreements by agreements plus disagreements and multiplying by 100. Agreement in each case was 100%, probably due to the very discrete nature of the target behaviors.

2.4. Experimental design and procedure

2.4.1. Experimental design

A multiple-baseline design across participants was used (Barlow, Nock, & Hersen, 2009). There were three phases: baseline, mindfulness practice, and follow-up.

2.4.2. Baseline

No experimental variables were manipulated and it was life as usual at home, community outings, and at school. Parents and siblings were instructed to respond to the adolescents as they usually would. Baseline measures were recorded for 3, 4, and 6 weeks for John, Paul, and George, respectively.

2.4.3. Mindfulness practice

The mother of each adolescent had been trained to use SoF by an experienced trainer a month prior to the beginning of baseline, and each had been instructed to use the procedure in her own life to control any negative emotionally arousing situation, such as rising anger. The training was based on the SoF trainers' manual (Singh, Singh, Adkins, Singh, & Winton, 2008). For the first 5 days of intervention, each mother taught her son to use this procedure during daily 15-min sessions. In the training sessions, the adolescent was seated comfortably in a soft chair with his feet flat on the floor and his hands resting gently on his thighs. He closed his eyes to increase his concentration and narrow his focus to the present moment. Then the mother provided the instructions in a calm and soft voice, taking her son through the steps outlined in Table 1. These steps involved learning how to focus on the soles of the feet until a state of calmness was reached and how to maintain this state while imagining different scenes that had previously given rise to aggressive behavior against parents and siblings as the targets, while at home and in the community.

The mothers taught their sons using verbal instructions and modeling. The mothers prompted their sons to use the procedure when they anticipated anger or aggressive behavior from their sons. The adolescents were also given an audiotape

Table 1
Training steps for *Meditation on the Soles of the Feet* procedure.

1.	If you are standing, stand in a natural rather than an aggressive posture, with the soles of your feet flat on the floor
2.	If you are sitting, sit comfortably with the soles of your feet flat on the floor
3.	Breathe naturally, and do nothing
4.	Cast your mind back to an incident that made you very angry. Stay with the anger
5.	You are feeling angry, and angry thoughts are flowing through your mind. Let them flow naturally, without restriction. Stay with the anger. Your body may show signs of anger (e.g., rapid breathing)
6.	Now, shift all your attention fully to the soles of your feet
7.	Slowly, move your toes, feel your shoes covering your feet, feel the texture of your socks, the curve of your arch, and the heels of your feet against the back of your shoes. If you do not have shoes on, feel the floor or carpet with the soles of your feet
8.	Keep breathing naturally and focus on the soles of your feet until you feel calm
9.	Practice this mindfulness exercise until you can use it wherever you are and whenever an incident occurs that may otherwise lead to you being verbally or physically aggressive
10.	Remember that once you are calm, you can walk away from the incident or situation with a smile on your face because you controlled your anger. Alternatively, if you need to, you can respond to the incident or situation with a calm and clear mind without verbal threats or physical aggression

of the instructions (recorded on their iPods) for use during self-practice. Each adolescent was required to practice twice a day with his mother, and whenever an incident occurred that could elicit aggressive behavior. The adolescents were instructed to practice the technique, and the mothers encouraged their practice, until they achieved three consecutive weeks of no aggressive behavior. For John, Paul, and George this requirement was reached after 17, 22, and 24 weeks, respectively. The initial teaching sessions were recorded and reviewed by the trainer for training fidelity. Fidelity of training was 100% for each parent–adolescent dyad.

2.4.4. Follow-up

Following termination of the mindfulness practice phase, data continued to be collected by the parents for 4 years, to assess the durability of treatment gains. No experimental variables were manipulated during follow-up.

3. Results

Fig. 1 shows the total number of instances of physical aggression for each adolescent each week during baseline and mindfulness practice, and each year during follow-up. During baseline, the number of instances of physical aggression varied both within and between individuals, and averaged 2.67 (range 2–3) for John, 2.50 (range 1–4) for Paul, and 3.17 (range 1–6)

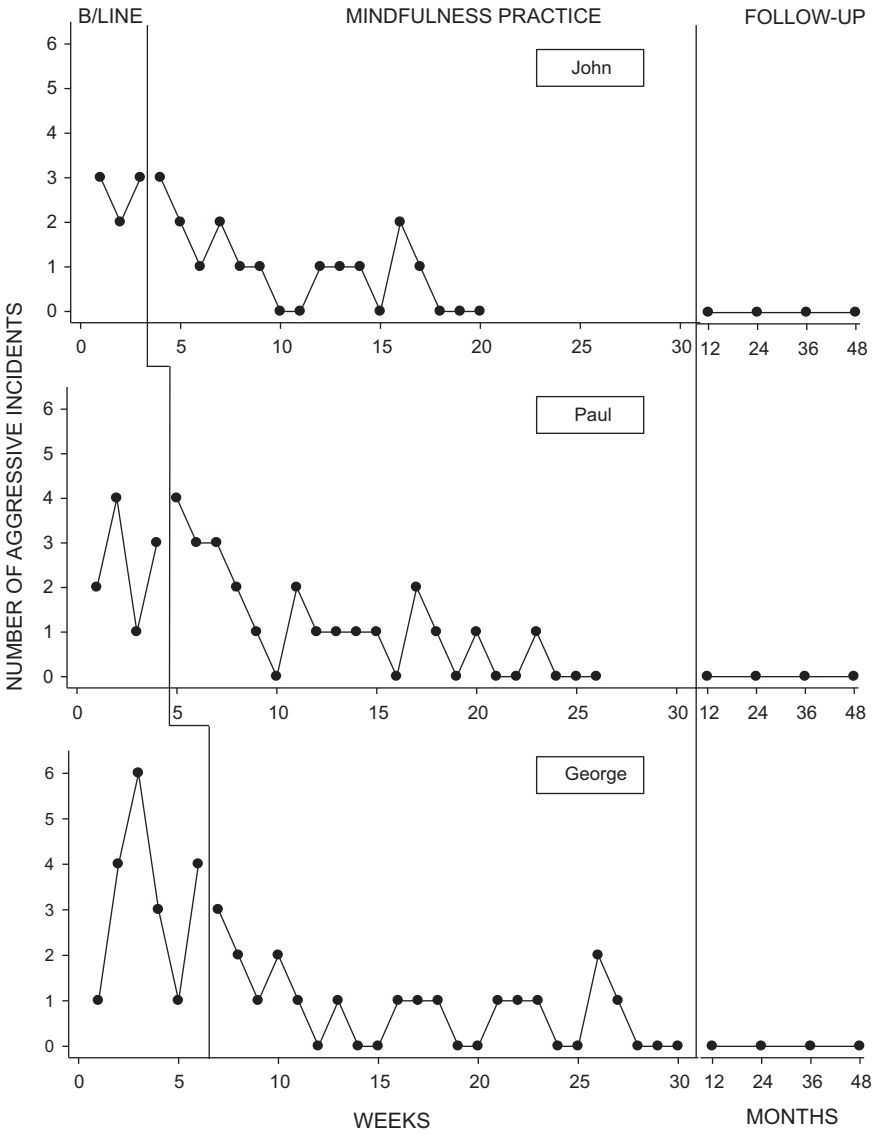

Fig. 1. Number of occurrences of physical aggression per week across the three adolescents during baseline and mindfulness practice, and per year during follow-up.

Table 2
Mean number of target variables per week during baseline, mindfulness practice, and follow-up.

	John			Paul			George		
	BL	SoF	F-U	BL	SoF	F-U	BL	SoF	F-U
Parent-reported variables									
Physical aggression	2.67	0.94	0.00	2.50	1.09	0.00	3.17	0.75	0.00
Incidents	2.67	2.12	0.00	2.50	2.77	0.00	3.17	2.17	0.00
Self-control	0.00	1.18	0.00	0.00	1.68	0.00	0.00	1.42	0.00
Parent injuries	0.67	0.18	0.00	0.00	0.00	0.00	1.17	0.29	0.00
Sibling injuries	0.67	0.18	0.00	0.25	0.09	0.00	0.83	0.13	0.00
Self-reported variables									
Incidents	2.67	2.76	0.23	2.50	4.50	0.10	3.17	3.25	0.04
Self-control	0.00	1.82	0.23	0.00	3.41	0.10	1.83	2.50	0.04

BL = baseline, SoF = Meditation on the Sole of the Feet, F-U = follow-up.

for George. During mindfulness practice, the number of instances of physical aggression averaged 0.94 (range 0–3) for John, 1.09 (range 0–4) for Paul, and 0.75 (range 0–3) for George per week. All three adolescents attained the criterion of zero instances for three consecutive weeks in 17, 22, and 24 weeks, respectively. None of the adolescents was ever observed engaging in aggressive behavior during the 4-year follow-up.

Table 2 shows the mean weekly number of responses on the target variables for each adolescent during the baseline, mindfulness practice, and follow-up phases. Other than for self-control, which showed an increase, all parent-reported measures (including parent and sibling injuries) decreased following mindfulness practice for each adolescent. All parent measures were at zero during follow-up. Each adolescent reported an increase in incidents and self-control from baseline to mindfulness practice. During follow-up, each adolescent reported a very small number of incidents and these always evoked self-control. During both mindfulness practice and follow-up, each adolescent reported more incidents than his parents.

4. Discussion

There are anecdotal reports of physical aggression by individuals with Asperger syndrome, but there is a paucity of intervention studies for aggression in this population. Indeed, we could not locate a single well-controlled published study attesting to the effectiveness of a psychosocial treatment targeting aggression. Our results suggest that SoF may be a useful self-control procedure for adolescents with Asperger syndrome. This finding mirrors that of Singh, Lancioni, Manikam, et al. (2011) who used a similar procedure to teach SoF to adolescents with autism for the self-control of physical aggression. In both studies, the SoF procedure was taught to mothers who in turn taught their sons, suggesting that the mindfulness procedure can be used by people other than research investigators or highly trained clinicians. In this respect, these studies add to the findings by Adkins, Singh, Winton, McKeegan, and Singh (2010) that the SoF research demonstrating its effectiveness can be translated into regular practice. In the current study, the mothers were the therapists, the SoF treatment was community-based, and the procedure was used by their sons throughout the day rather than in short experimental treatment sessions. The long-term follow-up data suggests that adolescents with Asperger syndrome can maintain their behavior for several years using the SoF procedure, accessing natural social reinforcers in the community, and generalizing their appropriate behaviors across settings, people, and contexts without externally programmed generalization.

This study extends the literature on the effectiveness of using SoF for self-management of aggression to individuals with Asperger syndrome. In fact, previous studies using this procedure, either alone or in combination with other procedures, had shown it to be effective in the self-management of challenging behaviors (e.g., Singh et al., 2007; Singh, Lancioni, Winton, et al., 2008), obesity (Singh, Lancioni, Singh, et al., 2008), smoking (Singh, Lancioni, Winton, et al., in press), and inappropriate sexual behavior (Singh, Lancioni, Winton, Singh, et al., in press). More generally, our present findings add to the literature on the effectiveness of mindfulness-based treatments for various clinical conditions (Didonna, 2009).

The current study was not intended to investigate the mechanisms that underlie behavior change due to the use of SoF. However, a simple behavioral explanation would suggest that SoF enables an individual to divert attention from an emotionally arousing thought, event, or situation to a neutral part of the body. The individual is able to stop, focus the mind back on the body, calm down, be in the present moment, and then make an informed choice about how to react to the thought, event, or situation that triggered the arousal response. This explanation is supported by the data from all adolescents that showed greater frequencies of incidents and self-control behaviors than were reported by their parents. If the adolescents had learned the procedure effectively this would have been expected. In fact, the parents would not be present for all incidents and, even if they were present, they would be unlikely to recognize every situation that constituted an incident and, consequently, a display of self-control by their sons. Our extensive experience with the clinical use of this procedure leads us to believe that once SoF is mastered to the point of automaticity, the individual can use it in multiple contexts, whether sitting, standing or walking slowly. Furthermore, one of its inherent strengths is that it provides the individual with an internalized response that is easy to master, portable, and can be accessed in almost any situation.

Informal conversations with the adolescents were salutary in terms of how they viewed the use of the SoF procedure. At first, all three were skeptical that they could "think" their way out of their aggressive behavior. However, when they started practicing SoF they changed their minds, and noted that the procedure was not really about thinking but about "not reacting" their angry thoughts. When they realized that they could actually observe their thoughts, they found it a very novel experience because it enabled them to observe the beginnings of their explosive angry episodes that resulted in aggression against their parents and siblings. All three noted that even though they understood how to observe their rising anger, at first it was difficult to shift the focus of their attention from the angry thoughts to the soles of their feet. They noted that the anger was so rapid that "I just don't have the time to shift my attention away from it" (Paul), or as John stated: "Man, by the time I was ready to shift my attention, I had already hit my parents." George noted that this almost automatic aggressive response slowed down with SoF practice in the absence of actual aggressive behavior, emphasizing the importance of consistent practice over long periods during the mindfulness practice phase. Towards the end of the mindfulness practice phase, and especially during follow-up, all three adolescents expressed satisfaction with being able to control their aggressive behavior. They were particularly pleased that they had stopped hitting their parents and siblings. When asked if they would recommend the procedure to others, they agreed with George who said, "yes, without hesitation," and when asked why, John said, "because it works, man, no question about it."

A limitation of the SoF procedure is that merely mastering it is not enough. To actualize its full potential requires consistent practice and use, a requirement seemingly difficult for many of us to implement. A further barrier is that this practice and use is needed for an extended time. As evident in our studies, the mindfulness practice takes weeks and months to achieve the desired outcomes. Of course, a compensatory factor is that, once mastered and implemented consistently, the outcomes are long-lasting in the absence of further training. This comports well with the emerging neuroscientific literature on mindfulness suggesting how this change may take place in the brain (Schwartz & Begley, 2002; Siegel, 2007). For example, current research suggests that one mechanism of action of mindfulness is that its practice lays down new neural networks in the brain while the older neural networks, that previously controlled the maladaptive responses to the same stimuli, are weakened through lack of use. This strengthening of new neural networks and weakening or eliminating others takes time to be established, and thus the need for long periods of mindfulness practice and use. When the behavior is of low frequency, as is often the case when dealing with challenging behaviors such as aggression, the natural opportunity for the use of SoF is reduced, thus extending the time for new neural networks to be consolidated. This is why we strongly stress the need for continued practice during the prolonged intervention phase in our studies.

In our studies using SoF for challenging behaviors, we have deliberately programmed follow-up data collection for extended periods, usually over a period of years. This is in contrast to similar studies using other treatment modalities, typically behavioral or psychopharmacological, that program very short follow-ups of a few days or weeks, if at all. Our reasoning is simple. The standard purpose for programming follow-up is to establish the durability of the behavior change, but for us follow-up is to assess not only the durability of the behavior change but also to indirectly assess whether a personal transformation has taken place due to meditation practice. After all, the essence of mindfulness practice is not to produce a specific behavior change, but to initiate a process for personal transformation.

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