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ORIGINAL PAPER

Effectiveness, Acceptability, and Feasibility of the Soles of the Feet Mindfulness-Based Intervention with Elementary School Students

Joshua C. Felver · Jennifer L. Frank · Amber D. McEachern

Abstract Children with high rates of disruptive behavior in elementary school are at risk for future psychosocial difficulties. Professionals who work in today's schools are in need of effective interventions to reduce rates of disruptive behaviors in schools in order to ensure optimal outcomes for students. We detail a pilot study of a brief mindfulness-based intervention, Soles of the Feet (SOF), for elementary school students. Three non-disabled students with high rates of off-task behavior during general education periods were selected and taught the SOF intervention. SOF took place over the course of five 20–30-min sessions in a public school setting. Using a multiple-baseline single-subject study design, results obtained via direct observation of student behavior during general education instructional time in the classroom suggest that SOF may be an effective intervention to reduce off-task behavior and increase academically engaged behavior for behaviorally challenging students. Questionnaires administered to these students and their teachers suggest that SOF is socially valid, feasible, and acceptable intervention for use in public schools. Conclusions extend the research of the effectiveness of SOF, and suggest that SOF is an effective short-term, resource non-intensive, and socially valid intervention for use with typically developing students with disruptive behavior in a public school setting.

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Introduction

The types of behaviors a student engages in during school have serious long-term implications. Academically engaged behavior in the classroom is related to prosocial psychosocial adjustment. Longitudinal research suggests that students who display more academically engaged behavior have better outcomes on measures of academic achievement and are less likely to drop out of high school (Greenwood et al. 2002; Fredricks et al. 2004). Conversely, disruptive and aggressive behaviors in school can lead to deleterious psychosocial outcomes. Disruptive behavior in youth frequently increases in severity throughout childhood (Silver et al. 2005), is correlated with later academic difficulties (Kim-Cohen et al. 2005), predicts later adolescent delinquent behavior (Broidy et al. 2003; Tremblay et al. 1992), and can result in adult psychopathology and incarceration (Schaeffer et al. 2003). Children who are more academically engaged during the school day are more likely to be met with long-term success, whereas children who have more disruptive behavior during the school day are at risk for long-term psychosocial difficulties. Specialized interventions which increase academic engagement and reduce problem behavior are therefore needed in today's classrooms.

Among the armamentarium of interventions used in schools to address student behavior, mindfulness-based interventions have received relatively little attention from school-based intervention scientists. Mindfulness, or "the self-regulation of attention so that it is maintained on immediate experience … [and] is characterized by curiosity, openness, and acceptance" (Bishop et al. 2004, p. 232) has in recent years become increasingly popular as a method of psychosocial intervention (Brown et al. 2007). Over the last decade, mindfulness-based interventions have become an increasingly

popular method of psychosocial intervention for children (Burke 2009) and have been suggested as a viable treatment approach in educational settings (Felver et al. 2013). Indeed, there is an emerging body of evidence demonstrating the effectiveness of mindfulness-based interventions for school-age populations (Greco et al. 2008; Lee et al. 2008; Semple et al. 2010) and in educational settings (Napoli et al. 2005; Saltzman and Goldin 2008; Singh et al. 2003). Although there continues to be a high amount of interest in mindfulness-based interventions for youth among intervention scientists and clinicians, more research is needed to document the effectiveness of these approaches in naturalistic settings, such as schools.

Of the existing manualized mindfulness-based intervention available for implementation and study, *Soles of the Feet* (SOF; Singh et al. 2003, 2011) is particularly promising for use in school settings given its focus on observable behaviors, established record of clinical effectiveness, time and cost efficiency, effectiveness with individuals with and without cognitive disabilities, and ease of use across multiple settings and contexts. SOF is an empirically supported manualized intervention protocol, consisting of five sessions lasting approximately 20–30 min. The goal of the SOF intervention is to teach individuals (a) how to recognize the antecedent conditions to their aggressive behavior, (b) disengage their attention from those precursors, (c) reorient their attention to a neutral point on the body, thereby discontinuing the escalation of problematic behavior, and (d) return to the activity taking place calmly (Singh et al. 2003). Once SOF is mastered to the point of automaticity in the setting it is initially taught, individuals are then encouraged to practice SOF in different contexts in order to support generalization across settings.

SOF has been found effective in reducing aggression among adults with disabilities, mental illness (Singh et al. 2008a, b, 2007c, b, 2003), obsessive compulsive disorder (Singh et al. 2004), and adolescents with conduct disorder (Singh et al. 2007a). A recently published randomized control trial of SOF demonstrated a reduction of aggressive behavior in adolescents and adults with intellectual disabilities (Singh et al. 2013). Other studies have found parents and clinical staff who utilize these techniques engage in more sensitive and responsive interactions with children and adults with disabilities, resulting in decreases in aggressive behavior (Singh et al. 2006a, b). Although the results of these efficacy trials show promise for SOF as an intervention for behavioral disruptions, the social validity, feasibility, and effectiveness of SOF with children in naturalistic school settings has not been established.

The objective of this research is to replicate and extend previous findings by delivering a pilot application of SOF to non-disabled elementary school students in a non-clinical, public school setting. This work expands on previous research by (a) pilot testing the effectiveness of SOF on reducing the disruptive behavior of elementary-age students, and (b) examining the feasibility, social validity and acceptability of this intervention when delivered in school settings.

Method

Participants and Settings

Approval for this study was initially obtained from the author's affiliated university institutional review board and the local education agency. General education teachers were then recruited from an elementary school within the school district to participate in this study. Consent was obtained from three third grade teachers who elected to participate in the study following a brief study of the procedures and recruitment presentation given at a teacher faculty meeting. These teachers were each asked to subjectively identify two students they felt had high levels of disruptive behavior and low levels of academic engagement during core instructional periods (e.g., mathematics or reading). Parental consent and student assent was obtained for all six students prior to student data collection or intervention procedures.

To objectively identify and confirm rates of student behavior, teacher interviews and direct observations were conducted. Teacher interviews involved study interventionists completing the Functional Assessment Checklist for Teachers and Staff (FACTS; March et al. 2000) with teachers. The FACTS is a brief semi-structured interview designed to identify the specific topography, frequency, duration, and intensity of a problematic behavior, and to identify the contexts in which the behavior is most likely to occur (e.g., antecedents, consequences, setting events, environmental factors). For the purposes of this study, the FACTS was used to identify each student's disruptive or academically off-task behaviors, and to identify the instructional period when these behaviors were most likely to occur. Teachers also received a brief introduction to SOF techniques and were provided a general orientation to the program by research study personnel at this time.

Following the identification of disruptive and off-task behavior of the identified students, study coordinators conducted preliminary direct observations of focal students' behavior were conducted to confirm teacher report. The criteria used to confirm high rates of student disruptive behavior were the occurrence of five or more instances of discrete off-task behavior (e.g., talking during silent reading) and low rates of task engagement (i.e., less than 50 % of time following teacher's specific instructional request) during a single 20-min observation period. All six students were confirmed to have high rates of disruptive behavior and low rates of academic engagement using these criteria. Although all six students would eventually receive the SOF intervention, only half (i.e., one student from each teacher's classroom) were randomly assigned to data collection and analysis. The decision to collect data on half

of the students was made due to a lack of necessary resources and personnel to complete data collection on all students; six students were initially recruited in the event that some of these students did not have high enough rates of disruptive behavior confirmed through preliminary observations. Study interventionists were not informed as to which students had been assigned to direct observation data collection and analysis so as not to bias their clinical efforts toward certain participants, in effect blinding interventionists to participants assignment to data collection or no-data collection conditions.

The three students selected for data collection were all enrolled in third grade, and received general education curricula. According to archival record review, no student was identified as having a disability according to federal IDEA standards. Zachary was a European-American boy who had high rates of disruptive behavior during language arts periods. FACTS analysis determined that he would become angry and defiant towards teachers when asked to complete independent seat work, refusing to comply with adult directives, tearing his assignments, and knocking over his chair. The function of Zachary's behavior was identified as escape from his school work and recruitment of adult attention. Dominick was a European-American boy who would refuse to complete school work and was disruptive throughout his school day. FACTS analysis determined that he was more likely to become disruptive during unstructured periods of the day, at which point he would get out of his seat, make noises, and drum his fingers loudly on his desk. The function of Dominick's behavior was identified as recruitment of peer attention. Caleb was a European-American boy who would become frustrated and noncompliant during language arts periods. FACTS analysis determined that when Caleb was asked to complete language arts assignments, he would refuse to complete his work, and would eventually escalate to yelling and pushing over his desk. The function of Caleb's behavior was identified as escaping a non-preferred activity.

Interventionists

Study interventionists were authors of the current manuscript. The first author was a masters level doctoral student with training in child and family therapy and mindfulness-based interventions; the third author was a post-doctoral level intervention scientist with training in both clinical psychology and mindfulness-based interventions.

Measures

Direct Observation of Student Behavior Three students were selected for direct observation of disruptive behavior. Observations lasted for 20 min during the class period when they were most likely to display disruptive and non-academically engaged behavior. Intervals were 15-s in duration. Coders recorded two independent classes of behavior during each

interval. *Academically engaged time* was operationalized as either actively or passively attending to assigned classwork or instruction (e.g., completing worksheets, listening to teacher instruction, and silently reading). Academically engaged instruction was recorded using a momentary-interval method, whereby an occurrence of the behavior was recorded if it lasted for the first 3 s of every 15-s interval. *Off-task behavior* was operationalized as either motor activity not directly associated with an assigned academic task (e.g., playing with a toy underneath the desk, getting out of the seat to walk around the room), verbalizations not related to an assigned academic task (e.g., making noises during silent reading, talking to another student during a quiz), or passively not attending to an assigned academic task for at least three consecutive seconds within a given 15-s interval (e.g., staring out the window, watching other students talk). Off-task behavior was recorded using a partial interval system, whereby an occurrence of the behavior was recorded if it occurred at any time during each 15-s recording interval.

Fidelity of Direct Observations Direct observations were conducted by trained research assistants who remained blind to each student's phase throughout the study. Research assistants were trained to an inter-observer agreement (IOA) level of 80 % accuracy prior to data collection. IOA was measured periodically with the study coordinator; IOA levels for each research assistant did not fall below 80 % accuracy for the duration of the study.

Post-Intervention Social Validity Questionnaires Students and their teachers completed a post-intervention questionnaire following completion of the intervention which was used to assess for feasibility, social validity, and acceptability of SOF. Participants were asked questions such as how effective the intervention activities were, frequency and contexts in which they were used (generalization), and whether or not they experienced any unintended positive or negative side effects resulting from their participation in the intervention or use of intervention strategies. Student social validity and acceptability was measured using an adapted version of the Children's Intervention Rating Profile (CIRP; Witt and Elliott 1985), a seven-item measure using six-point Likert-type scale, in which children responded to how much they agreed or disagreed with statements about the fairness, acceptability, and potential side effects of SOF. Internal consistency reliability estimates of the CIRP range from 0.75–0.89 (Witt and Elliott 1985). Teacher feasibility, social validity, and acceptability were measured by an eight-item social validity questionnaire constructed for this study (see Appendix).

Experimental Design and Procedure

This study employed a multiple-baseline across subjects design with three phases: baseline, SOF training, and post-

intervention. Following conventional multiple-baseline procedures, baseline data collection began simultaneously for all three students until a stable level behavior was observed. Students were randomly assigned to their SOF training phase order (i.e., receiving the intervention first, second, or third), and after 1 week of baseline data collection, the first student Zachary began the SOF intervention. The other students began the SOF intervention only after the preceding student had finished, with start dates staggered at least 1 week apart, with accommodations made based on school schedule and student attendance.

Baseline Baseline data collection commenced simultaneously for all students. At least three observations were collected in the week immediately prior to the first student, Zachary, beginning the intervention phase in order to establish a stable measurement of student behavior. Baseline data collection continued for the other two students until they began their own SOF intervention phases.

SOF Intervention During the intervention phase, students met with their assigned interventionist for five 20–30-min sessions during consecutive school days in a private room reserved for the school psychologist at their elementary school. At least one direct observation data point was collected during this phase. Sessions were scheduled to minimize disruption of classroom activities and student instruction.

Intervention activities followed the scope and sequence of the established manualized procedure (Singh et al. 2003, 2007a, b, c, 2011). During the first session, students were explained that the purpose of SOF is to learn a technique to stay calm when feeling upset so that one does not "get in trouble in the classroom," followed by an explanation and guided practice of the technique. In the second, third, and fourth sessions, students practiced the SOF intervention when they were feeling happy, angry, and frustrated, respectively. Students had the feelings elicited by first describing to the interventionist a recent situation when the specified emotion occurred (e.g., getting teased at recess and becoming angry), and then the interventionist would induce the feeling by verbally recounting the experience back to the student. Once the student evidenced behavioral expression of the emotion (e.g., a scowl on their face at having the experience of being teased described to them), the student was instructed to practice the SOF routine to interrupt the emotional response. In this way, students developed an effective routine to discontinue a response cycle that could lead to further emotional arousal (e.g., increased anger and frustration) and/or associated escalated behavior (e.g., aggressive and disruptive behavior). The fifth session was used to further practice the routine and plan for practice during school and at home to increase generalization to other settings.

Post-intervention During the weeks following the SOF intervention phase, data collection of disruptive and academically engaged behavior continued for as many days as possible until the end of the school year.

SOF Fidelity of Implementation

Intervention fidelity was monitored using a short form following each of the five sessions. Key components of the intervention were detailed in the form of a checklist, which the interventionist then used to record whether they implemented each step of the SOF intervention.

Results

Collected data for total academically engaged and off-task behavior for each of the three students across baseline, SOF intervention, and follow-up phases of the study are displayed in Figs. 1 and 2 (respectively). Clinicians were able to implement the SOF intervention with 100 % fidelity for all students in this study according to intervention component checklist completed after every session. Table 1 presents mean behavioral occurrence for each of the coded behaviors for each student across study phases.

In analyzing these data SOF, appears to increase student academic engagement. Zachary had an initially low and stable rate of academically engaged behavior at a mean level of 37 % of the observation period. His amount of observed academic engagement initially declined at the onset of the SOF intervention, but adjusted to a high and stable level of over 90 % for the remainder of his observations, providing the most compelling data among the three students for the effectiveness of the intervention. Dominick displayed a stable baseline level of academically engaged behavior prior to beginning the SOF intervention. During and following his learning SOF, he had generally high rates of academic engagement, with the exception of one observation. This observation point appears to be an outlier given his generally high rates of behavior during other observations. Caleb's rate of baseline behavior was less stable than the other two boys, with most observations falling between 10 % and 40 % of time spent academically engaged, and one observation period of high academic engagement above 80 %. During and following his learning the SOF intervention, Caleb's observed academically engaged behavior was generally high (i.e., above 79 %), however given the instability of his data during baseline and the limited number of observations, these findings are less compelling than the other students.

Post-intervention social validity data show that SOF was acceptable for both students and teachers. Table 2 details student responses to the CIRP. Students answered that they

**Fig. 1** Average total academically engaged behavior per observation
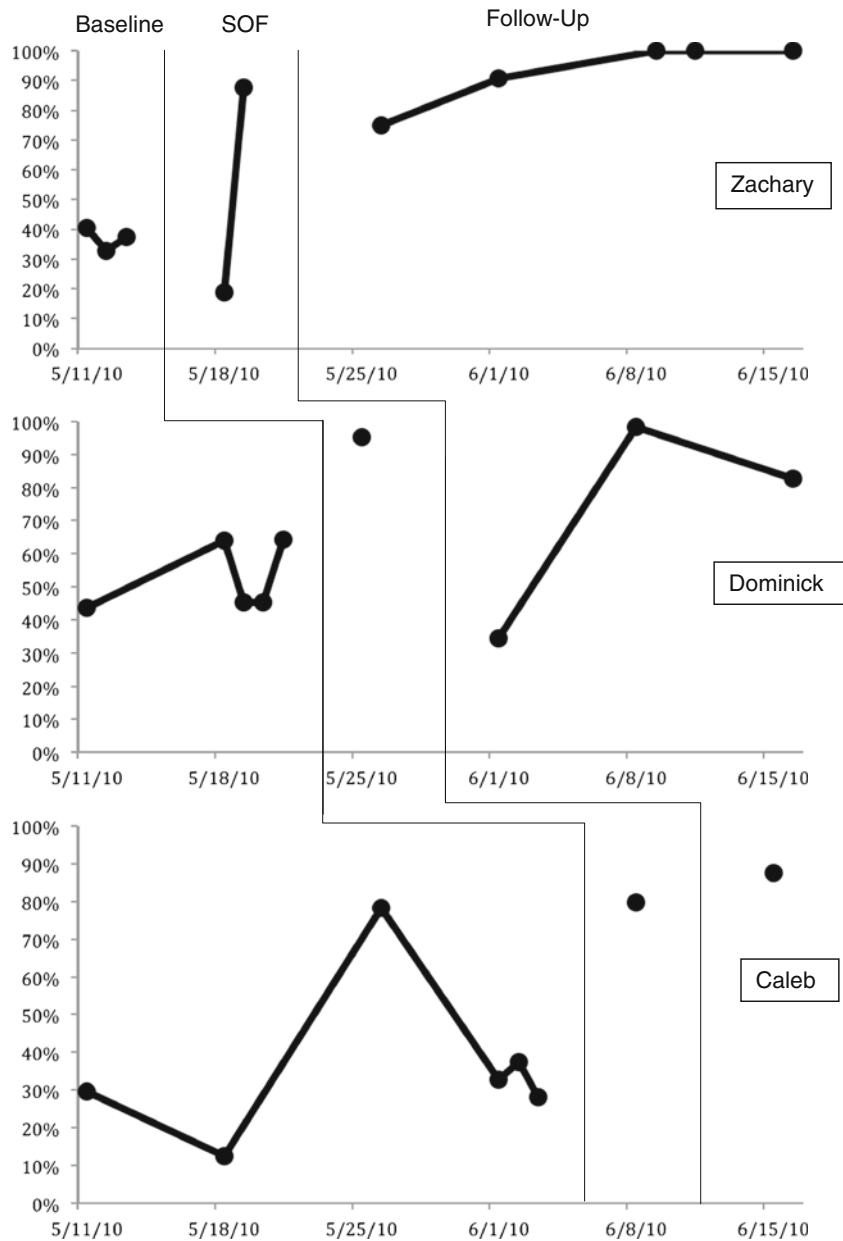
agreed that SOF was an acceptable intervention, reporting that they believed it was a useful method to help them at school, and that they enjoyed learning the technique. When asked what they thought should be changed about the way students are taught SOF in schools, every student reported that nothing should be changed. Students also reported that they do not believe SOF causes any problems with their friends, suggesting that SOF is a socially valid practice for these students in school. On the post-implementation questionnaire completed by teachers (see Appendix), the SOF intervention was reported to be an acceptable and socially valid practice to be used with students in their classroom and responses were uniformly positive. Teachers reported that they did not have any immediate

concerns about the intervention prior to it beginning (e.g., "sounded like a great idea"), that they felt that SOF was effective for their students (e.g., "he calmed down when frustrated"), and that they would recommend it for other teachers (e.g., "students really need this type of training", "it's easy for teachers and students").

Post-implementation data also suggests that SOF is a feasible intervention. Student responses on the CIRP (see Table 2) indicate that they did not believe SOF was difficult to use, that they felt SOF was a fair technique to learn during school, and that they did not believe that anything should be changed about the existing intervention. Teacher responses to the post-implementation questionnaire also suggest that SOF

Fig. 2 Average total off-task behavior per observation
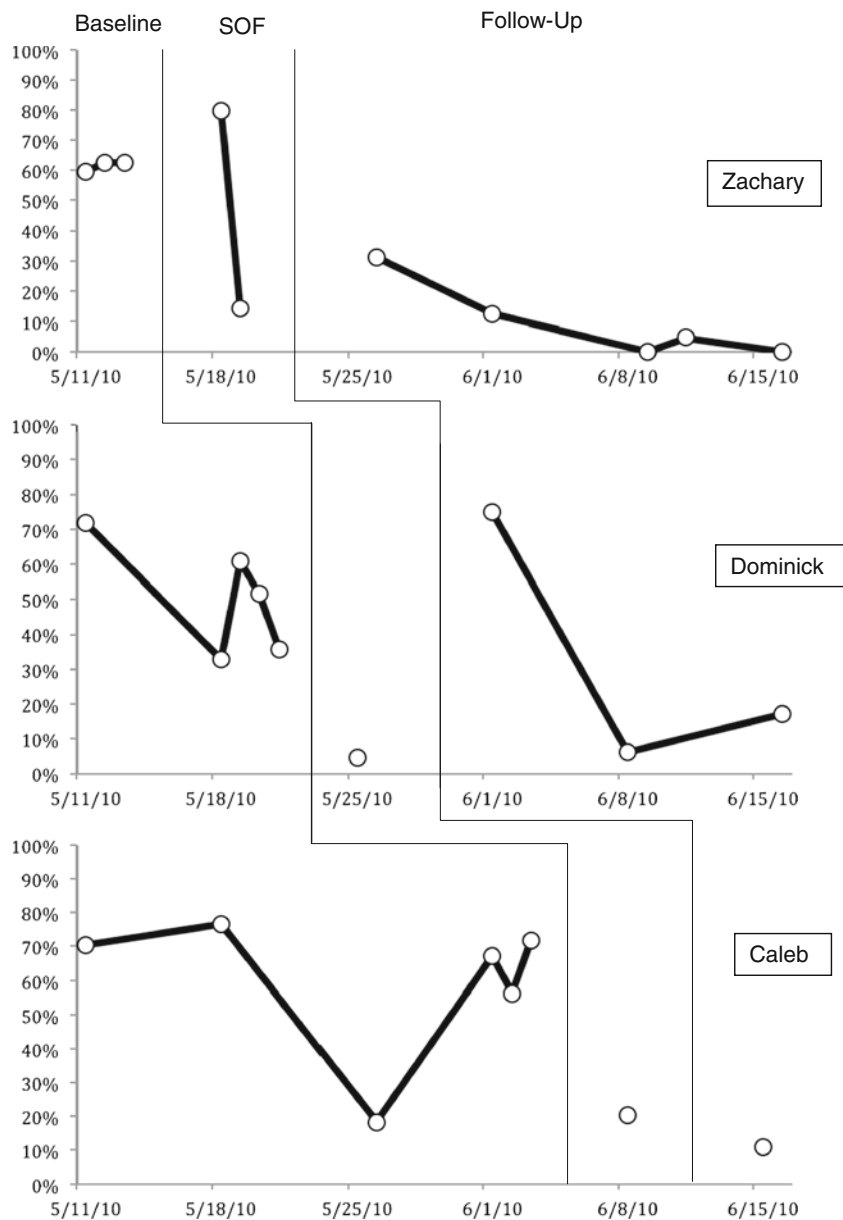
was a feasible practice, as teachers all answered "yes" to the open ended question "Overall, is the amount of time teachers invest in implementation reasonable?".

Discussion

The data from this study suggests that elementary school students with high rates of disruptive behavior who complete the SOF intervention spend more time being academically engaged in the classroom and less time displaying off-task behavior. These findings extend previous research that has documented SOF being an effective intervention for reducing problematic behavior in adults with disabilities by demonstrating clinical effectiveness with typically developing children in

a naturalistic school setting. It can be postulated that with student's reduction in disruptive behavior, they were more able to be engaged with, and perhaps learn, the academic material presented in the classroom. This is important given the deleterious long-term outcomes of disruptive behavior, and successful outcomes of academically engaged behavior in grade school. Today's schools are in need of simple, cost-effective interventions to improve the outcomes of students, and SOF appears to offer a viable option to meet this need.

Beyond the effectiveness of SOF in improving student behavior in this study, the intervention was reported to be socially valid for use in schools. Students and teachers indicated that they felt that SOF was appropriate, effective, and acceptable for use in classrooms, suggesting that public school are open and willing to implement mindfulness-based programming with

Table 1 Average percentage of time across observations student engaged in a behavior

Student	Study phase		
	Baseline	SOF intervention	Follow-up
Zachary			
Total academically engaged	37.0	53.1	93.1
Actively engaged	20.3	23.4	74.7
Passively engaged	16.7	29.7	18.4
Total off-task	61.5	46.9	9.7
Off-task motor	50.5	14.8	4.1
Off-task verbal	10.9	14.1	1.3
Off-task passive	7.2	24.2	4.4
Dominick			
Total academically engaged	52.5	95.3	71.9
Actively engaged	28.6	64.1	54.2
Passively engaged	23.9	31.3	17.7
Total off-task	50.6	4.7	32.8
Off-task motor	28.9	4.7	18.8
Off-task verbal	13.8	0.0	11.5
Off-task passive	17.9	0.0	7.3
Caleb			
Total academically engaged	36.5	79.7	87.5
Actively engaged	22.8	12.5	45.3
Passively engaged	13.7	67.2	42.2
Total off-task	60.0	20.3	10.9
Off-task motor	40.3	20.3	3.1
Off-task verbal	21.9	0.0	7.8
Off-task passive	5.0	0.0	0.0

their students. It is also worth noting that clinicians were able to implement SOF with 100 % fidelity after only 5 h of training, and that clinicians spent only 2.5 h of actual face-to-face direct interaction with students. Given the tight economic climate of

Table 2 Mean student responses to social validity questionnaire (CIRP)

Item	Mean response[a]
1. Soles of the Feet is fair	6.0
2. Doing Soles of the Feet is too hard	1.0
3. Doing Soles of the Feet might cause problems with my friends	1.0
4. There are better ways to deal with feelings than Soles of the Feet	3.0
5. Soles of the Feet would be good to use with other students	6.0
6. I liked doing Soles of the Feet	5.7
7. I think Soles of the Feet will help me do better in school	5.3

[a] Student responses to CIRP items anchored as: 1 = "I do not agree" and 6 = "I agree"

today's schools, effective and time-limited interventions such as SOF are needed to meet student's behavioral needs without taxing a school district's already limited financial resources.

This work lends further evidence to the growing body of research showing that youth can benefit from mindfulness-based interventions (Burke 2009). It also lends evidence to the postulation that mindfulness-based interventions can be effective in public school settings (Felver et al. 2013). Furthermore, the intervention was found to be acceptable in this particular context, suggesting that mindfulness-based interventions are a viable treatment in a secular educational context. It is worth noting that the researchers in this study were careful to present this intervention in a secular fashion, detailing exactly what SOF entailed and what SOF teaches children to do precisely. In this way, we worked to ensure that teachers and administrative personnel understood that this mindfulness-based intervention was specifically designed to teach children a skill to control their behavior and emotions and not to teach them "meditation" or anything connoting an Eastern religious tradition (e.g., Buddhism). We believe that presenting the SOF intervention in this manner increased buy-in and acceptability ratings among the public school staff by pre-correcting any misconceptions that mindfulness-based intervention are non-secular in nature.

Study Limitations

There are several limitations to the current work which should be noted and addressed in future studies of SOF in school-aged populations. First, in our work we did not measure if children were actually using the SOF routine during the school day. As the SOF routine, and indeed many mindfulness practices, is a largely covert behavior, we did not employ an observational method to capture student practice. Although this was not measured in the current study, students reported to interventionists and observers that the SOF techniques had been employed during classroom instructional time. Future work may employ a measurement, either via self-report or observation, of the frequency of student use of the SOF routine. Second, our study focused on a demographic category. Although participation in the intervention was open to the entire elementary school, participants were only selected from third grade classrooms, and all participants were males. Future work may recruit a more diverse group of participants. Third, several of our participants had limited data collected on their behavior during the follow-up phase. Best-practice in single-subject research suggests the gathering of at least three data points in each study phase to establish a stable level of behavior (Horner et al. 2005). The conclusion of the school year limited the number of data collection points used in this study, and although these data points suggest an effect of the intervention, more data would have been useful to definitively confirm a functional relation between the intervention and observed behavior.

Future Research Directions

Results of this study revealed potential benefits in terms of using SOF among non-disabled elementary school-aged children. Future research should seek to replicate these findings and to pilot similar work with older students in middle and high schools. Our pilot revealed a relatively high degree of acceptability among teachers and students in using these practices. Real-world implementation revealed meaningful improvements in student behavior. This study used general education students to pilot the SOF intervention. In future work, it may be useful to study special education students to see if similar results could be achieved. SOF may be an extremely helpful intervention for students in a special education setting, as some of these students have higher rates of disruptive and academically disengaged behavior, and SOF has been found to be helpful with adults with disabilities in other studies (Singh et al. 2003). Future work may also measure whether the SOF routine learned in the classroom generalized to other contexts. Two students in the current study anecdotally reported that they used the SOF routine at home to calm down when in stressful situations, suggesting that SOF may generalize to other contexts. Studies may also wish to examine the efficacy of a teacher led SOF intervention, as this could potentially bolster the generalization of the behavior to other settings throughout the school day.

Implications for Practice

Clinicians who work in public school may note that this is a relatively low-cost intervention, taking place over five 20–30-min sessions, thus minimizing both interventionist and student time. Further, this intervention is manualized and easy to implement based on teacher and student report. Clinicians in our study reviewed, practiced, and implemented the intervention with high fidelity after only approximately 5 h of training, and several weeks of personal practice, further indicating that SOF is easy to implement in public schools. Interventionists wishing to employ a mindfulness-based intervention should base their clinical work on a firm grounding of personal experience with the intervention, as it is our experience that the effective delivery SOF occurred only after we found that we could use the technique with fluency in our own lives. Clinicians interested in integrating mindfulness-based interventions into their existing armamentarium or behavioral interventions should consider utilizing SOF in their school-based practice.

SOF has been found to be effective among a variety of individuals with different levels of functioning. This study suggests that SOF is an acceptable and useful intervention for children in public school settings, and should be considered a promising approach to addressing the needs of today's youth in educational settings.

Appendix

Post-implementation social validity interview for teacher

1. What were your initial thoughts regarding this intervention when you first began to learn about it? Did you have any immediate concerns or questions?
2. Are the types of problems addressed by the SOF program important?
3. Overall, is the amount of time teachers invest in implementation reasonable?
4. What elements of implementation did you find most challenging?
5. Do you feel the SOF program was effective for this student?
6. Would you recommend this intervention to other teachers?

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