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To Fidget or Not to Fidget, That Is the Question: A Systematic Classroom Evaluation of Fidget Spinners Among Young Children With ADHD

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Abstract

Objective: To examine how fidget spinners affect children with ADHD's gross motor activity and attentional functioning in class, both during the initial and final phase of an intensive evidence-based behavioral treatment. **Method:** Using an A-B-A-B design, 60 children (M_{age} = 4.86 years, 83% Hispanic) diagnosed with ADHD participated in the study. Following a baseline period, four random children from each classroom were given fidget spinners across three separate days (n = 48). Children wore accelerometers and were videotaped for 5-min during class in which attentional data were coded. **Results:** During the initial phase of treatment (but not during the final phase), the use of fidget spinners was associated with a decrease in activity levels. Children's use of fidget spinners was associated with poorer attention across both phases of treatment. **Conclusion:** Fidget spinners negatively influence young children with ADHD's attentional functioning, even in the context of an evidence-based classroom intervention. *(J. of Att. Dis. XXXX; XX(X) XX-XX)*

Keywords
ADHD, young children, fidget spinner, intervention

ADHD affects between 3% and 10% of children in the United States (Froehlich et al., 2007; Polanczyk, Willcutt, Salum, Kieling, & Rohde, 2014) and is associated with a host of serious negative consequences including poor school outcomes (Loe & Feldman, 2007; Nigg & Barkley, 2014). Well-established and evidence-based interventions for children with ADHD include behavioral parent training and/or stimulant medication (Chronis, Chacko, Fabiano, Wymbs, & Pelham, 2004; MTA Cooperative Group, 2004; Pelham & Fabiano, 2008). However, given the well-documented self-regulation deficits among children with ADHD (Barkley, 1997; Graziano et al., 2015), as well as some laboratory findings indicating that children's hyperactive movements can improve performance on attention tasks (Hartanto, Krafft, Iosif, & Schweitzer, 2016; Sarver, Rapport, Kofler, Raiker, & Friedman, 2015), there has been an increased interest in the promotion of occupational therapy tools (e.g., stress balls). Most recently, the fidget spinner, a small device typically seen as a three-pronged design with a bearing in its center circular pad that is rotated between a child's fingers, has emerged as an extremely popular, yet untested, self-regulation toy. The current study seeks to conduct an empirical evaluation of the fidget spinner to determine whether it indeed helps children with attentional difficulties, such as those diagnosed with ADHD, and improves their classroom functioning.

Theoretically speaking, the functional working memory model in ADHD hypothesizes that children with ADHD's excessive movements can be beneficial in increasing their prefrontal cortical arousal and alertness while engaged in academic/cognitive tasks (Rapport et al., 2009). Emerging empirical work measuring children's movements objectively (e.g., accelerometers) supports the model such that higher rates of gross motor activity positively predicted children with ADHD's performance on a working memory task. On the contrary, gross motor activity had no association with working memory performance among typically developing (TD) children (Sarver et al., 2015). Similarly, Hartanto et al. (2016) found that more intense movement was associated with better cognitive control performance among children with ADHD but had no impact on TD children. However, it remains unclear the extent to which a self-regulation toy such as the fidget spinner (a) promotes similar gross motor activity, especially given that the toy is the one mostly moving, and (b) improves performance in a classroom setting.

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While neuropsychological theories vary in terms of the underlying deficits (e.g., executive function, delay aversion, motivational dysfunction) causing ADHD (Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005), the resulting expression of inattention is associated with significant impairment, especially within the academic domain. For example, subtype analyses have demonstrated that children with a combined or primarily inattentive presentation of ADHD are more impaired in learning (as reported by teachers) than those with the predominantly hyperactive/impulsive presentation (82%, 76%, and 23%, respectively; Gaub & Carlson, 1997). Reading and math difficulties are also primarily linked to inattention symptoms of ADHD (Marshall, Hynd, Handwerk, & Hall, 1997; Paloyelis, Rijsdijk, Wood, Asherson, & Kuntsi, 2010). In fact, most 504 plan accommodations and behavioral consultation models for helping children with ADHD in the classroom promote minimizing classroom distractions (e.g., sitting in the front of the class; Raggi & Chronis, 2006). Thus, a colorful and fun object for a child with ADHD such as the fidget spinner may have an adverse effect on the child's classroom functioning by impairing his ability to stay on task and pay attention to other classroom stimuli (e.g., the teacher leading a lesson). In fact, teachers have anecdotally reported that fidget spinners are a major distraction in the classroom and are often misused as an entertainment device rather than for therapeutic purposes (Faust, 2017). Some news outlets have conducted informal surveys indicating that a significant number of schools have even banned fidget spinners (Thayer, 2017).

Objectives of the Current Study

A recent review by Schecter, Shah, Fruitman, and Milanaik (2017) concludes that despite the surge in popularity in fidget spinners, among other occupational therapy toys, the lack of rigorous scientific studies precludes any conclusions regarding their potential benefits or adverse effects. Scientifically examining the potential benefits or adverse consequences of such self-regulation therapy toys is critical for informing educators, physicians, mental health professionals, and parents on how to best help children with ADHD in a classroom setting. The current study is the first, to our knowledge, to rigorously examine among a sample of young children diagnosed with ADHD the extent to which fidget spinners (a) increase gross motor activity, (b) improve children's behavioral and attentional functioning in class, and (c) distract other children in class. We examined these research questions within an analog classroom environment (i.e., 30-min English language arts [ELA] period) both during the initial phase of an intensive evidence-based behavioral treatment (i.e., first 2 weeks of the Summer Treatment Program [STP]; Graziano, Slavec, Hart, Garcia, & Pelham, 2014; Pelham et al., 2010) as well as toward the final phase of the treatment (i.e., last 2 weeks of the STP). Using an A-B-A-B within-participants design, we hypothesized that children with ADHD's gross motor activity would remain unchanged during days with or without the fidget spinner. We also hypothesized that children with ADHD's behavioral and attentional functioning in the class would be worse on days they used the fidget spinner, especially during the initial phase of the treatment. Finally, we hypothesized that the presence of the fidget spinner would significantly increase the number of behavioral and attentional problems exhibited by other children in the class.

Method

Recruitment and Participants

The study was conducted at a large urban university in the southeastern United States with a large Hispanic/Latino population. Families were recruited from local preschools, elementary schools, and mental health agencies through brochures, radio ads, and open houses/parent workshops to participate in the STP. Inclusion criteria consisted of (a) a diagnosis of ADHD, (b) enrollment in school during the previous school year, (c) an IQ of 70 or higher on the Wechsler Preschool and Primary Scale of Intelligence, Fourth Edition (WPPSI-IV; Wechsler, 2012), (d) no history of a primary diagnosis of Autism or Psychotic Disorder, and (e) ability to attend an 8-week STP. Forty-six families were screened out due to not meeting the above criteria.

The final sample consisted of 60 children (M_{age} = 4.86 years, 75% male) whose parents provided informed consent to participate in the research study and took part in the intervention. Questionnaires offered in the parents' preferred language were completed primarily by mothers (97%) across all study assessments. Sixty-two percent of children were referred by school or mental health/medical professionals. See Table 1 for sample demographics including rates of diagnoses derived from a combination of parent structured interview (Computerized-Diagnostic Interview Schedule for Children; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000) and parent and teacher ratings of symptoms and impairment (Disruptive Behavior Disorders [DBD] Rating Scale, Pelham, Gnagy, Greenslade, & Milich, 1992; and Impairment Rating Scale, Fabiano et al., 2006), as is recommended practice (Pelham, Fabiano, & Massetti, 2005). According to parent report at intake, only six children were on any psychotropic medication. The children's doses were maintained throughout the treatment and our results were the same with and without the inclusion of these six children.

Procedures

This study was approved by the university's institutional review board. All families participated in a pretreatment assessment scheduled prior to the start of the STP to confirm children's ADHD status and intellectual functioning.

Table 1. Participant Baseline Demographic Variables.

	Total sample (*n* = 60)
Demographic variables	
Child sex (% male)	75
Child age (*M*)	4.86 (0.75)
Child race (%)	
Hispanic/Latino	83
Non-Hispanic/Latino White	7
African American	7
Other/multiracial	3
Maternal education (%)	
Some high school	2
High school graduate	7
Some college	18
Associate's degree	5
Bachelor's degree	32
Advanced degree	33
Caregiver age (mean)	35.59 (6.33)
Household structure (%)	
Married	70
Single	18
Screening measures	
Child IQ	95.30 (14.49)
BASC-3 externalizing *T*-score (P)	63.14 (10.40)
BASC-3 externalizing *T*-score (T)	65.34 (12.34)
DBD: ADHD mean item score (P)	1.79 (0.56)
DBD: ODD mean item score (P)	1.22 (0.70)
ADHD + ODD diagnosis (%)	78
ADHD only diagnosis (%)	22

Note. Values enclosed in parentheses represent standard deviations. BASC-3 = Behavior Assessment System for Children, Third Edition; P = parent report; T = teacher report; DBD = Disruptive Behavior Disorders Rating Scale; ODD = Oppositional Defiant Disorder.

Setting

The STP (Pelham et al., 2010), and its adaptation for prekindergartners (STP-PreK; Graziano et al., 2014), is an 8-week, intensive, evidence-based, multimodal intervention for children with ADHD and related problems. The program consisted of a behavior modification program as well as an academic and social-emotional curriculum that took place daily from 8:00 a.m. to 5:00 p.m. Children were placed in four classrooms (14 to 18 children per classroom) and were led by one teacher and five paraprofessional counselors (per group). Two licensed psychologists provided supervision to staff on a daily basis. Children spent the day participating in various recreational and academic activities while staff members implemented a comprehensive behavioral management system. Of particular interest to the current study is children's behavioral and attentional functioning during an ELA classroom period (30 min) in which teachers read stories to the children, as well as engaged in activities to promote children's phonological awareness and vocabulary development.

Design

The current study used an A-B-A-B within-participants design conducted across two phases of the STP.

Initial phase of treatment. The first baseline period occurred during the first week of the STP. Data were collected from four random children from each classroom (*n* = 16) rotated across three separate days for a total of 48 children. Each of these children was videotaped during the ELA classroom period for 5 min in which behavioral and attentional data were collected. These children also wore accelerometers during the day to measure their gross motor activity. Behavioral and attentional data from the rest of the classroom were also collected via the STP point system.

The first fidget intervention period occurred during the second week of the STP. The same random group of children, from which baseline data were collected, was given a fidget spinner to use during the day. Only four children per classroom had a fidget spinner during the same day. Counselors were instructed to allow children to use their fidget spinner in their hands appropriately (e.g., spinning the fidget spinner while holding it or spinning it in front of them in the carpet or their desk). However, counselors continued to implement the behavioral modification system targeting classroom rule violations (e.g., leaving seat, not paying attention, not being respectful) some of which could be related to the use of the fidget spinner (e.g., using the fidget spinner to hit another child, not paying attention to the teacher because of playing with fidget spinner). Once again, each of these children was videotaped during the ELA classroom period for 5 min in which behavioral and attentional data were collected. These children also wore accelerometers during the day to measure their gross motor activity. Behavioral and attentional data from the rest of the classroom were also collected via the STP point system.

Final phase of treatment. The same exact procedures were replicated for obtaining a second baseline period, which took place during the sixth week of the STP, as well as for obtaining a second fidget intervention period, which took place during the seventh week of the STP.

Measures

Treatment fidelity. Two separate research assistants coded the extent to which children actually used the fidget spinner during the 30-min ELA period at both intervention periods. Codes were on a 4-point scale (0 = *child never used the* *fidget spinner during the observation*, 1 = *child used the fidget spinner some of the time during the observation*, 2 = *child used the fidget spinner often during the observation*, 3 = *child used the fidget spinner during almost the entire observation*). The interrater reliability among the coders was excellent ($r = .95$).

Gross motor movement. Children wore accelerometers (Actical device, Phillips-Respironics, Oregon, USA) during the baseline and fidget intervention days (mean number of minutes = 201.80, *SD* = 14.72), which included the observed 30-min ELA period. Per standard practice, the Actical device (dimensions = 29 mm × 37 mm × 11 mm, weight = 22 g) was placed in the iliac crest of children's hip on an elasticized belt and individually calibrated by inputting the child's height, weight, and age. Data obtained from the Actical during the day (captured in 15 s epochs) included step counts, time spent at various levels of movement intensity (sedentary, light, moderate, vigorous), as well as energy expenditure (total number of kilocalories the child expended during the day). The current study focused on step counts during the ELA period as a measure of children's gross motor movement.

Disruptive behavior. ADHD and ODD symptoms were measured using the DBD Rating Scale (Pelham et al., 1992). The DBD is a 45-item measure that asks parents/teachers to rate, on a 4-point scale ranging from 0 (*not at all*) to 3 (*very much*) the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*; American Psychiatric Association, 1994) symptoms of ADHD, ODD, and CD. Past studies have documented that the DBD rating scale has good internal consistency ($\alpha = .91$-$.96$) and is sensitive to behavioral intervention effects (Pelham et al., 2005). Average raw scores across ADHD ($\alpha = .88$) and ODD symptoms ($\alpha = .87$) as reported by parents were computed and used in the current study.

Behavioral and attentional functioning in classroom. During a 30-min ELA period, frequency counts of children's behavioral and attentional functioning were collected as part of the STP point system (Pelham et al., 2010). Specifically, counselors recorded every instance in which children were out of their area/seat as well as not paying attention to the teacher or task. Two separate research assistants coded such rule violations ("area" and "attention") during a 5-min video observation. The interrater reliability among the coders for "area" and "attention" violations were excellent ($r = .92$ and .93, respectively). The current study examined the total number of "area" and "attention" rule violations during the observed ELA period committed by children who were randomized to receive the fidget spinners ("target children") and for those who did not receive the fidget spinners ("non-target children").

Data Analysis Plan

All analyses were conducted using the SPSS Version 22.0. There were minimal missing data (only three children were absent during their scheduled fidget spinner observation). We first examined any associations between demographic variables as well as ADHD and ODD symptoms and children's gross motor activity and behavioral/attentional functioning in the classroom. To examine the impact of having a fidget spinner, we conducted multiple repeated measures ANCOVAs, controlling for class. Although we did not have a between-participants factor, within-participants follow-up contrast tests with a Bonferroni correction to minimize Type 1 error were conducted to examine any changes from the baseline periods to the fidget spinner intervention periods. We conducted separate analyses for data collected during the initial phase of treatment (i.e., first 2 weeks of STP) versus data collected during the final phase of treatment (i.e., final 2 weeks of STP). Cohen's *d* effect size estimates ([baseline period—fidget spinner intervention period]/pooled *SD*) were provided for all analyses.

Results

Preliminary Analyses

Descriptive statistics. An analysis of the demographic variables revealed that children whose mothers reported higher levels of education committed fewer "area" violations (first observation period, $r = -.38$, $p < .01$ and second fidget spinner intervention observation, $r = -.33$, $p < .05$). Similarly, children whose mothers reported higher levels of education took less total steps during the ELA period in the classroom (first and second baseline observations, $r = -.31$ and $-.36$, $p < .05$, respectively). Age was also associated with children's attentional functioning and activity levels in the classroom. Specifically, older children committed fewer "attention" violations (first fidget spinner intervention observation, $r = -.30$, $p < .05$, second fidget spinner intervention observation, $r = -.44$, $p < .01$) and took less total steps during the ELA period in the classroom (first baseline observation, $r = -.27$, $p = .06$, second baseline observation, $r = -.29$, $p < .05$). Preliminary analyses did not yield any other significant associations between demographic variables and any of our outcomes. In addition, no significant associations emerged between DBD symptom severity and any outcomes. Subsequently, maternal education and children's age were controlled in all analyses.

Use of fidget spinner. Upon given the chance, children used the fidget spinner at a high frequency during the first intervention observation ($M = 2.49$ out of 3, $SD = .89$) as well as during the second intervention observation ($M = 2.53$ out of 3, $SD = .79$). In fact, only two children never used the fidget spinner during the observations. The majority of children

Table 2. Summary of Results.

	First baseline period[a]	First fidget intervention period[b]	Second baseline period[c]	Second fidget intervention period[d]	Cohen's *d*
Total steps (O)	249.96 (27.67)	183.54 (25.76)	284.98 (41.49)	293.67 (42.62)	**−.37**$^{\dagger ab}$, .15^{ac}, .03^{cd}
"Area" RV-nontarget child (O)	2.69 (0.38)	2.60 (0.90)	3.04 (0.47)	3.20 (0.40)	−.02^{ab}, .11^{ac}, .05^{cd}
"Attention" RV-nontarget child (O)	0.87 (0.14)	0.82 (0.13)	0.51 (0.09)	0.54 (0.12)	−.05^{ab}, **−.41**^{*ac}, .04^{cd}
"Area" RV-target child (O)	1.32 (0.36)	0.52 (0.14)	0.75 (0.18)	0.55 (0.16)	**−.44**^{*ab}, −.30^{ac}, −.18^{cd}
"Attention" RV-target child (O)	0.75 (0.18)	1.64 (0.23)	0.82 (0.16)	1.50 (0.16)	**.66**^{**ab}, .06^{ac}, **.65**^{**cd}

Note. Values enclosed in parentheses represent standard errors. All analyses covaried for maternal education, child age, and class. The *p* values are reported for contrast tests between observation periods (e.g., "ab" = comparison of first baseline period and first fidget intervention period). O = Observational measure; RV = rule violations. Bold indicates significant effect sizes.
$^{\dagger}p < .08$. $^{*}p < .05$. $^{**}p < .01$.

used the fidget spinner during almost the entire observation (71% during first intervention observation and 69% during second intervention observation). Use of fidget spinner was not related to DBD symptom severity.

Fidget spinner and child gross motor activity. As seen in Table 2, during the initial phase of the STP, a marginal effect was found, $F(1, 42) = 3.38$, $p = .07$, when comparing children's gross motor activity during the first baseline observation with the first fidget intervention observation, even after controlling for maternal education, child age, and class. Specifically, children took marginally less steps during the ELA period when using the fidget spinner ($M = 183.54$, $SE = 25.76$) compared with the baseline period ($M = 249.96$, $SE = 27.67$), Cohen's $d = -0.37$. On the contrary, during the final phase of the STP, no significant changes were noted in gross motor activity from the second baseline observation compared with the second fidget intervention observation, $F(1, 42) = .065$, $p = .799$. d = .03.

Fidget spinner and nontarget children's classroom functioning. As seen in Table 2, the nontarget children's behavioral and attentional functioning was not significantly affected by the presence of fidget spinners among a subgroup of children. Specifically, during the initial phase of the STP, the total number of "area" and "attention" rule violations committed by children who did not have the fidget spinner was similar during the baseline observation as well as when some children were using the fidget spinners, $F(1, 54) = .079$, $p = .78$, $d = -.02$ and $F(1, 54) = .082$, $p = .78$, $d = -.05$, respectively. Similarly, no effect was found during the final phase of the STP as the total number of "area" and "attention" rule violations committed by children who did not have the fidget spinner was similar during the second baseline observation, as well as when some children were using the fidget spinners, $F(1, 54) = .13$, $p = .72$, $d = .05$ and $F(1, 54) = .10$, $p = .75$, $d = .04$, respectively.

Fidget spinner and target children's classroom functioning. As seen in Table 2 and Figures 1 and 2, significant changes were observed during the initial phase of the STP, when comparing

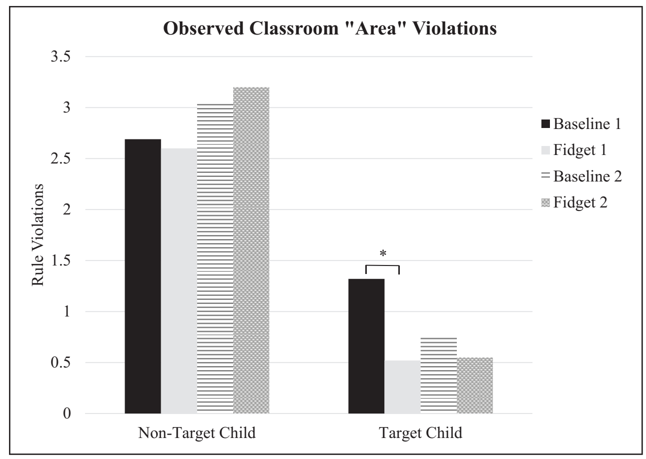

Figure 1. Number of observed "area" rule violations.
Note. All analyses covaried for maternal education, child age, and class.
$^{*}p < .05$.

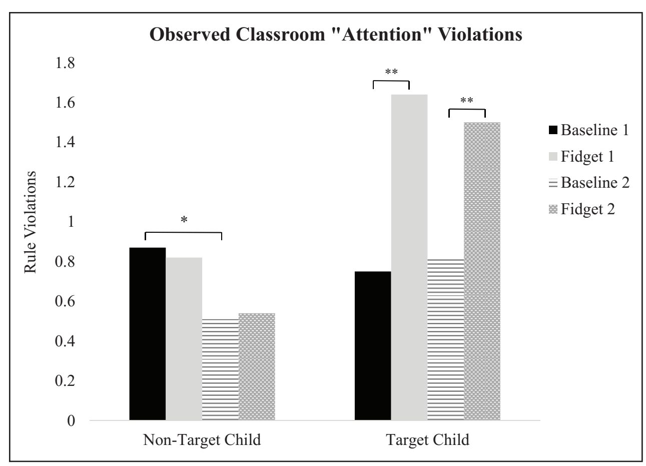

Figure 2. Number of observed "attention" rule violations.
Note. All analyses covaried for maternal education, child age, and class.
$^{*}p < .05$. $^{**}p < .01$.

the target children's "area" and "attention" classroom violations during the first baseline observation with the first fidget intervention observation, even after controlling for maternal education, child age, and class. Specifically, children committed significantly *fewer* "area" violations during the 5-min ELA observation period when using the fidget spinner (M = .52, SE = .14) compared with the baseline period (M = 1.32, SE = .36), $F(1, 40) = 6.65$, $p < .05$, $d = -.44$. On the contrary, children committed significantly *greater* "attention" violations during the 5-min ELA observation period when using the fidget spinner (M = 1.64, SE = .23) compared with the baseline period (M = .75, SE = .18), $F(1, 40) = 7.50$, $p < .01$, $d = .66$.

During the final phase of the STP, no effect was found for the fidget spinner in terms of children's "area" violations, $F(1, 40) = .018$, $p = .90$, $d = -.18$, as children committed similar levels of these violations when using the fidget spinner (M = .55, SE = .16) compared with the baseline period (M = .75, SE = .18). However, even during the final phase of the STP, there was an effect for the fidget spinner in terms of children's "attention" violations, $F(1, 40) = 12.89$, $p < .001$, $d = .65$. Specifically, children committed significantly *greater* "attention" violations during the 5-min ELA observation period when using the fidget spinner (M = 1.50, SE = .16) compared with the baseline period (M = .82, SE = .16).

Discussion

Within the context of a multimodal intervention, the STP, we were able to investigate the extent to which fidget spinners affect young children with ADHD's gross motor activity, their behavioral and attentional functioning in the class, and other children in the class. During the initial phase of the STP, the use of fidget spinners was associated with a decrease in children's gross motor activity as measured via observed "area" violations as well as objectively via accelerometers. However, no association was found between fidget spinner use and children's activity levels (measured either via accelerometers or via observed "area" violations) during the final phase of the STP. On the contrary, children's use of fidget spinners was associated with poorer attention both during the initial and final phases of the STP. Finally, use of fidget spinners did not appear to affect other children in the classroom as these nontarget children committed on average similar number of "area" and "attention" violations regardless of whether there were any target children in the class using fidget spinners.

The theoretical appeal of providing a fidget spinner to a child with attentional difficulties lies in the functional working memory model of ADHD (Rapport et al., 2009) and supporting laboratory studies, which have shown that higher rates of gross motor activity positively predict children with ADHD's performance on cognitive tasks (Hartanto et al., 2016; Sarver et al., 2015). Our study shows that simply providing a child with a fidget spinner does not actually result in an increase in gross motor activity, rather it decreases such activity levels. This lack of increase in gross motor activity may not be surprising, given that children only have to use their hands to operate the fidget spinner. It is important to note that a decrease in gross motor activity in our study may be functionally positive, as children in the classroom were less likely to commit "area" violations when using the fidget spinner. Thus, the fidget spinner was effective in reducing children with ADHD's hyperactivity in the classroom. However, it is important to point out that it was only during the initial phase of treatment (i.e., first week of STP) in which the fidget spinner had a positive impact in terms of reducing children's hyperactivity. The STP is a well-established multimodal behavioral intervention for children with ADHD in terms of improving children's attentional abilities, on-task behaviors, and decreasing behavioral rule violations (Graziano et al., 2014; Pelham et al., 2010). It appears then, that once a classroomwide behavioral intervention system is implemented, the positive impact of the fidget spinner on decreasing children's hyperactivity ceases to exist.

Given teacher concerns regarding the extent to which a self-regulation tool and/or "toy" may be a source of classroom distraction, many schools have banned the use of fidget spinners (Thayer, 2017). Counter to this notion, our study is the first to show that having a couple of children in a classroom using such a device for therapeutic purposes does not actually affect the overall behavioral and attentional functioning of the *other* children in the class. However, the strongest set of findings of the current study shows the fidget spinner's negative impact on the user's attentional functioning. Specifically, children committed more than double the number of "attention" violations when using the fidget spinner compared with their baseline functioning. In addition, the negative impact of the fidget spinner on children's attention did not vary according to the phase of treatment. Thus, despite being in an intensive behavioral treatment for 6 weeks, the fidget spinner still had a negative impact on children's attentional functioning. Rather than staying on task and paying attention to the teacher during an ELA period, children were more off task and paying more attention to the fidget spinner than the lesson. Despite receiving reprimands from counselors in the class, young children with ADHD's attention to the fidget spinner speaks to the strong reward sensitivity bias that has been observed among youth with ADHD (Aase & Sagvolden, 2006). Providing a "therapy" tool to a child with ADHD requires the child to not view that tool as a reward. It is apparent that children with ADHD see a fun object that spins on your hands as a fun toy rather than something to help them "focus." Our finding is also consistent with past work showing the lack of effect for other occupational tools such as therapy balls for children with ADHD (Taipalus, Hixson, Kanouse, Wyse, & Fursa, 2017).

There were some limitations to the current study that need to be addressed. First, due to the clinical nature of our sample, there were no TD children in the classrooms. Hence, we could only speak to the impact of the fidget spinner on young children with ADHD's behavioral and attentional functioning. It is possible that among a TD sample, use of the fidget spinner would not result in any adverse attentional effects. Similarly, it is possible that TD children would be more distracted by a couple of children in their class using a fidget spinner. However, this possibility is unlikely, given significant work showing that TD children experience much less distractibility compared with children with ADHD (Gumenyuk et al., 2005). Second, our objective measure of gross motor activity (total steps) entailed the use of an accelerometer that was placed in children's hip area. Given that the fidget spinner requires children to use their hands to operate it, future work should examine the extent to which hand motor activity is affected by the use of fidget spinner. Most importantly, it remains unclear whether an increase in hand motor activity relates to more on-task behaviors as past laboratory studies examined motor activity as function of sitting in a chair and/or ankle/leg movements (Hartanto et al., 2016; Sarver et al., 2015).

Third, our study took place within an analog classroom environment, both during the initial phase of an intensive evidence-based behavioral treatment and toward the final phase of the treatment, which entailed having several counselors in each classroom to monitor the children. This type of treatment setting and accompanying extra supervision may have attenuated the impact of the fidget spinner on children's behavioral and attentional functioning. Thus, it will be important for future studies to examine the impact of fidget spinners (or other occupational self-regulation tools) within actual classrooms that are not implementing a behavioral modification system with several counselors in the room. In addition, a more authentic classroom setting would need to include a mixture of TD children along with a few children with ADHD. Obtaining teacher ratings of children's attentional and behavioral functioning during periods on and off the use of such an occupational self-regulation tool would also be important. Finally, another limitation was the homogeneity of the sample, which was largely Latino (83%) due to the study's geographical location. However, this limitation may also be viewed as a strength as Latino children represent the fastest growing group in the United States but are understudied in child psychopathology research (La Greca, Silverman, & Lochman, 2009).

In sum, despite the surge in popularity of occupational tools (e.g., weighted vests, therapy/stability balls), a lack of rigorous studies exists to determine these tools' impact on children with ADHD's classroom functioning (Nielsen, Kelsch, & Miller, 2017; Schecter et al., 2017). This study is the first, to our knowledge, to rigorously examine among a sample of young children diagnosed with ADHD the extent to which fidget spinners improve children's behavioral and attentional functioning in class and whether it distracts other children in class. Although the use of fidget spinners did not distract other children in the classroom, they negatively affected young children with ADHD's attentional functioning, even in the context of an evidence-based classroom intervention. Thus, the clinical implications are clear in that educators, physicians, and mental health professionals should *not* advocate for the use of fidget spinners in the classroom setting. Parents should also be aware of its adverse effects on children with ADHD's attentional functioning. Rather, both providers and parents should advocate for other classroom-based interventions for children with ADHD including teacher consultation/training (DuPaul et al., 2006) and implementation of a daily report card (Fabiano et al., 2010).

Authors' Note

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