

The Effect of Movement on Attention in Elementary-Aged Students

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ABSTRACT

As the number of students diagnosed with attentional issues continue to rise, educators are constantly looking for alternative ways to keep students engaged for longer periods of time so that they are accessible for learning. The purpose of this study is to determine if a movement strategy, a bouncy band, will help students focus attention for longer periods of time and increase on-task behavior. A convenience sample of 25 students identified with attentional issues were selected to participate in the current study. Pre and post assessments indicated that the bouncy bands did have a positive effect on the student's ability to maintain attention, listen attentively to adults/peers, and follow oral directions. In addition, results from the pre and post observations suggested that when the bouncy band was used as a movement strategy, there was a marked decrease in students off-task behaviors. Results from the interviews suggested that most of the participants believed that the bouncy bands were fun, helped them to focus, relax, and feel calmer when taking tests.

Keywords: ADHD, bouncy bands, movement techniques, school counselors

As the number of children diagnosed with ADHD is increasing, the ability to recognize these symptoms in younger children is critical (Gochenour & Poskey, 2017). While some research has indicated that only about 5% of elementary school students have been diagnosed, recent findings have shown that the prevalence of ADHD is much higher (Rowland et al., 2015). As most studies have not accounted for the frequency of misdiagnosis and symptom control, the actual rate of ADHD is suggested to be higher than the 3-7% estimation reported in some studies (Rowland et al., 2015; Gochenour & Poskey, 2017). In a recent population-based sample of 7,587 children, 15.5% of elementary students have been found to qualify for a diagnosis of ADHD (Rowland et al., 2015).

Although ADHD can contribute to struggles in many areas of life, children with this disorder have been found to struggle tremendously in the school setting (Rowland et al., 2015; Ehm, Kerner auch Koerner, Gawrilow, Hasselhorn, Schmiedek, 2016; Ross & Randolph, 2016). Elementary students with ADHD have been found to have higher absence rates, greater retention, lower test scores, and lower standardized scores than students without ADHD (Rowland et al., 2015). Furthermore, recent studies report that students with ADHD are at a heightened risk of academic underachievement (Ehm et al., 2016; Ross & Randolph, 2016).

Compared to students without ADHD, students with this diagnosis experience greater difficulty with task vigilance (Ross & Randolph, 2016). Ross and Randolph (2016) found that within a classroom of 7-11-year-old students with and without ADHD, those with ADHD demonstrated greater difficulty maintaining and returning focus to a task. In addition, there was a statistically significant difference between these two groups in completion rates of tasks involving copying and math problem solving.

Several studies have indicated that limiting distractions and maintaining focus are some of the main challenges that students with ADHD face (Ross & Randolph, 2016). This is not surprising, as the core symptoms of ADHD include poor concentration, attention, and distractibility, inordinate movement and fidgeting, and low impulse control (Rowland et al., 2015). Successful academic performance requires quite the opposite of these symptoms- high levels of concentration and impulse control. Effective modifications are necessary, as most of these students spend a large portion of their day (approximately 6-8 hours) in the school environment (Foran, Mannion, & Rutherford, 2017).

Sensory Processing

Research suggests that attentional deficits in children stem from difficulty processing sensory information (Burgoyne & Ketcham, 2015). Burgoyne and Ketcham (2015) describe the attentional process in detail. Effective sensory processing requires the coordination of two critical attentional systems in the brain- the vestibular and proprioceptive systems. The vestibular system interprets sensory information from other systems, and coordinates sensory input. The proprioceptive system provides information on the level of attention and amount of effort required for physical activity. These two systems are responsible for integrating the input that is received from the environment, and assisting individuals in producing appropriate responses to the input.

Although the processes of these systems occur relatively quickly for many individuals, it has been suggested that individuals with sensory processing disorders experience greater difficulty (Burgoyne & Ketcham, 2015). Symptoms of an underdeveloped or improperly functioning vestibular system include inability to focus without moving, difficulty with reading,

and decreased auditory processing- symptoms found to be present in children with ADHD (Burgoyne & Ketcham, 2015).

From previous findings, it can be inferred that sensory processing in the brain is linked to the learning process (Burgoyne & Ketcham, 2015). Research suggests that overwhelming the vestibular and proprioceptive systems with additional stimuli (such as movement) may improve the sensory input process in the brain and help the brain to focus on only the relevant stimuli (Burgoyne & Ketcham, 2015). Incorporating specific techniques such as therapy/yoga balls, wiggle cushions, and bouncy bands have been found to have a beneficial impact on attention in elementary school students (Burgoyne & Ketcham, 2015; Seifert & Metz, 2017).

Benefits of Movement

Several studies have found that numerous physical activity exercises have resulted in positive physical and academic changes (Burgoyne & Ketcham, 2015; Seifert & Metz, 2017; Specifically, studies have shown that incorporating movement techniques can increase both students' on-task behavior and self-regulating behavior (Burgoyne & Ketcham, 2015; Foran et al., 2017; Seifert & Metz, 2017). Although research is still limited, certain studies indicate that a variety of seating modifications have been found to increase on-task behavior (Burgoyne & Ketcham, 2015). Long-term on task behavior, such as being willing to participate, adopting a more active role in classroom roles, and exhibiting increased energy, has been found to increase (Burgoyne & Ketcham, 2015).

When sitting in standard, stationary chairs, students demonstrate on-task behavior only about 50% of the time (Burgoyne & Ketcham, 2015). Alternative seating options such as therapy/yoga balls, wiggle cushions and bouncy bounds have been investigated as promising

options in recent studies. Several studies incorporating a variety of these movement techniques in elementary school have found the attentional benefits to surpass standard stationary seating.

Seated Movement Techniques

Research suggests that wiggle cushions, an alternative seating modification, contribute to the development of on-task behavior and sensorimotor skills (Seifert & Metz, 2017). Wiggle cushions, or wiggle seats are special cushions that can be placed in a chair or on the floor, and allow for greater movement as opposed to standard seating (Seifert & Metz, 2017). Seifert and Metz (2017) explored the advantages of using wiggle cushions in an academic setting. In a preschool classroom, wiggle cushions were implemented in alternating phases during a 7-10 minute structured circle time. Following usage of the wiggle chairs, students were more likely to engage in activities such as singing and movement, and were less likely to participate in off-task behavior such as side conversations. Furthermore, the effect of wiggle cushions on attention and persistence were shown to be statistically significant, meaning students were more likely to demonstrate focus and persistence following usage of the wiggle cushions.

Therapy/ yoga balls have also been linked to increased attention and on-task behavior (Burgoyne & Ketcham, 2015). Burgoyne and Ketcham (2015) examined the on and off-task behavior in a second-grade classroom. On-task behavior was defined as having an active role in the classroom, being willing to participate, following classroom rules, and exhibiting high energy toward learning. Off-task behavior was classified as demonstrating little to no effort, having a passive role in the classroom, demonstrating negative affect, and exhibiting low energy toward academic tasks.

Burgoyne and Ketcham (2015) found that during the first observation, only 50.3% of

students' behavior was considered on-task. Leaning, tapping, or kneeling consisted of 40.06% of students' behavior, while 47% of students' behavior was stationary. The second observation involved therapy chairs. Although only 34.19% of behavior was stationary, on-task behavior increased. In the third observation, (involving therapy balls) 64.77% of the behavior was stationary, and 84.9% of student behavior was considered on-task. Furthermore, movement was more controlled and subtle following the third observation.

Another seated movement technique that has only recently gained attention is bouncy bands. In an independent study, Bisson, Sanborn, & Pilcher (2017) observed 25 elementary students in an after-school, educational program for 2 hours each day over the course of 4 weeks. A range of off-task behavior was observed including passive-off task behavior, (not actively looking at assignment) verbal off-task behavior, (inappropriate verbal behavior such as calling out) motor off-task behavior (fidgeting, out of seat). Student body and head orientation was also examined, and measured the student's orientation to the desk. Results revealed that the students who displayed higher off-task behavior before the study demonstrated fewer off-task behaviors when using the bouncy bands.

While a few studies have demonstrated promising findings regarding seated movement techniques on student attention, the number of studies on this topic is still limited. Multiple studies on more modern techniques such as bouncy bands have not been found within the current literature. Furthermore, while these studies have addressed the effects of movement techniques on student attention in general, even fewer studies have examined attention and on-task behavior in students with an attentional diagnosis such as ADHD.

The purpose of this study is to determine if a movement strategy, a bouncy band, will

help students (identified with an attentional issue) focus attention for longer periods of time and increase on-task behavior. This study was guided by the following research questions: 1-In what ways can the bouncy band be used as an efficient tool to help students sustain attention?, 2-How may the bouncy bands assist student's ability to stay on task?, and 3-How did students' perceive the overall effectiveness of using the bouncy band? It is hypothesized that students who use the bouncy band will be able to sustain attention for longer periods of time which will lead to an increase of on-task behavior.

METHODOLOGY

A mixed-method research design was used to answer the research questions on how a bouncy band may be used to help students sustain attention and increase on-task behaviors. Pre-and post- measures of on-task behaviors, as well as personal and social development outcomes were collected. In addition, interviews of participants with the purpose of analyzing as to how they perceived the overall effectiveness of the bouncy band were conducted. A convenience sample of 25 students in grades 1-5 (21 males and 4 females) from a rural elementary school in Frederick County, MD that have been identified with an attention issue were selected to participate in the study. One female was sent to an alternative school during the study, reducing the sample size to 24. This study was sent to the supervisor of school counseling and to the county's legal services for approval prior to the recruitment of participants. In addition, permission was obtained from the principal of the school and her immediate director. An informational session was offered to parents prior to the start of the study to explain the purpose of the research, to answer any questions and to obtain informed consent. Parental permission was granted for all the students who participated in this study. Finally, results were shared with the participants and their parents.

Baseline data was obtained from participants' first quarter report cards. Effort in the areas of attention, self-control, listening, and following directions were noted. Then, students were given a bouncy band, instructed on how to use it, explained its purpose and encouraged to use it throughout their school day. Data from students' fourth quarter report cards were used to compare and evaluate the effectiveness of the bouncy band. In addition, individual observations were made pre and post induction of the bouncy band. Students were observed for a 15 minute

block of time during direct instruction. The number of times the student was off-task during this time frame was compared to the number of off-task behaviors after the bouncy band was given to them. The data obtained from the report cards as well as the observations were entered into SPSS, a statistical software package used to conduct data analysis. A paired t-test was used to determine if there was a difference between the participants effort prior to and following the use of the bouncy band. Additionally, another paired t-test was administered to verify the effectiveness of the bouncy band on decreasing off-task behavior at the beginning and completion of the study. Finally, structured interviews were used to provide insight into the perception of the participants involved. Statements such as, “Bouncy Bands help me focus in class.”, “Bouncy Bands make it easier to do my work.”, and “Bouncy Bands let me move so I can relax better.” helped to guide these interviews.

RESULTS

Report card data from the 24 participants were reviewed to determine if there was a difference between the baseline data obtained after the first quarter and after the bouncy band was implemented as a strategy to increase on-task behaviors. The four areas of effort in the personal and social development section of the report card that were studied were: engages/maintains attention to learning tasks, exhibits self-control, listens attentively to adults/peer and follows oral directions. The results on the attention, ($t(23)=-3.114$, $p<.05$) listening, ($t(23)=-3.715$, $p<.05$) and following directions, ($t(23)=-3.122$, $p<.05$) suggested that the bouncy bands did have a positive effect on the participants' behaviors in those sub-categories. Table 1 presents the pre and post data collected on all four sub-categories.

STUDENT ATTENTION AND MOVEMENT

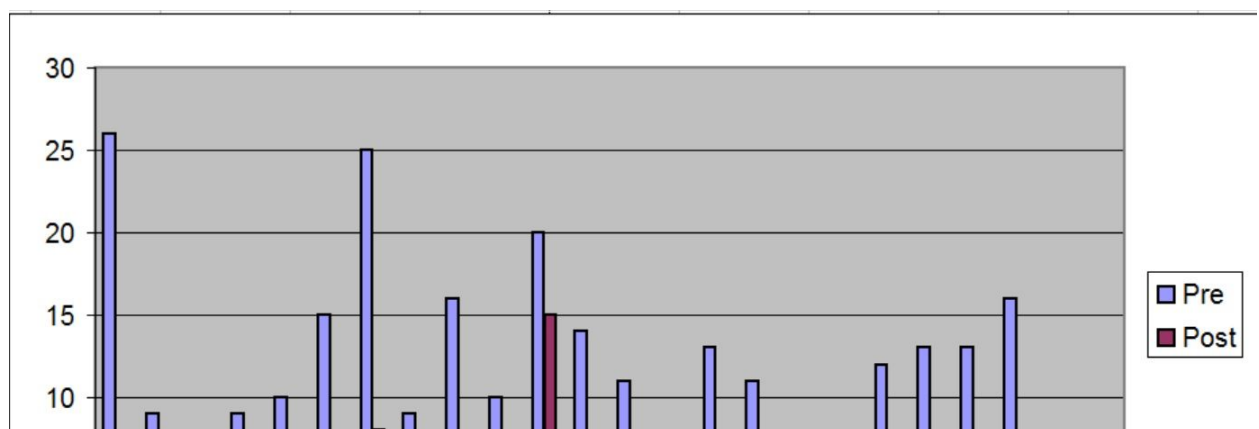
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Paired Samples Test									
		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pre-Engages/Maintains Attention - Post_Attn	-.458	.721	.147	-.763	-.154	-3.114	23	.005
Pair 2	Pre-Exhibits Self-Control - Post-Exhibits Self-Control	-.292	.751	.153	-.609	.025	-1.904	23	.070
Pair 3	Pre-Listens Attentively to Adults/Peers - Post-Listens Attentively to Adults/Peers	-.500	.659	.135	-.778	-.222	-3.715	23	.001
Pair 4	Pre-Follows Oral Directions - Post-Follows Oral Directions	-.417	.654	.133	-.693	-.141	-3.122	23	.005
Pair 5	Pre-Off Task Observations - Post-Off Task Observations	7.083	5.477	1.118	4.771	9.396	6.336	23	.000

Table 1 *Pre and post data from report cards and observations*

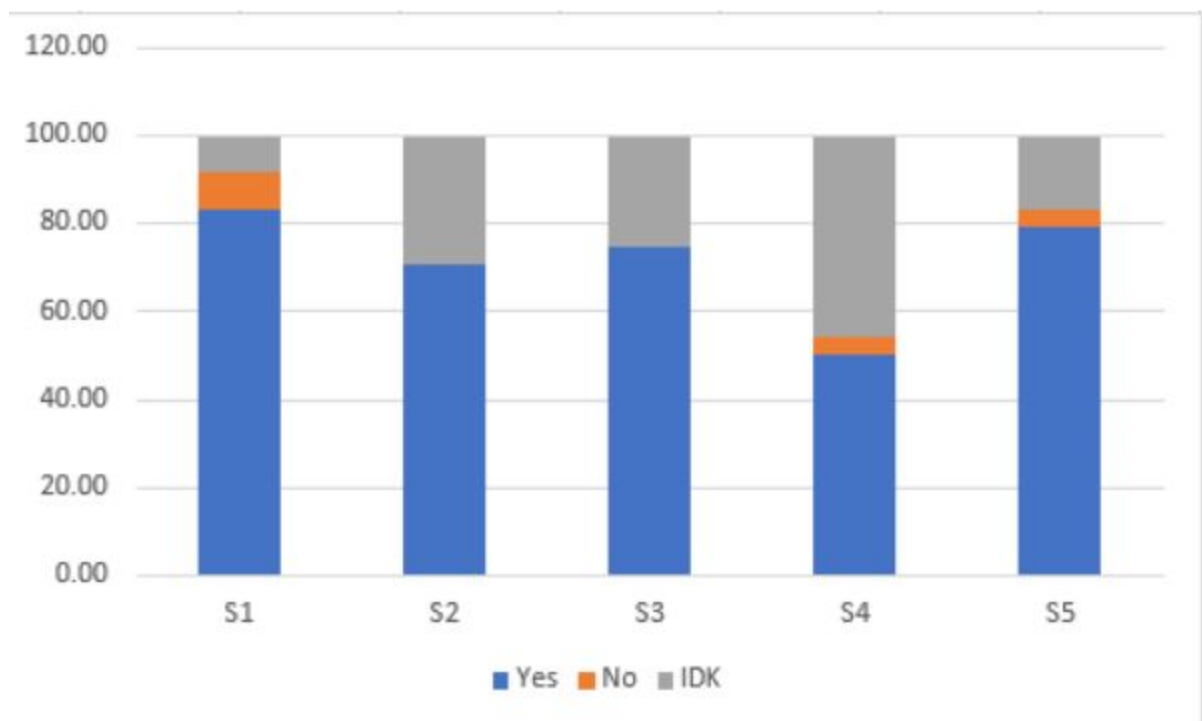
In addition, observations were conducted before and after the introduction of the bouncy band as a movement strategy. The number of off-task behaviors were tallied and compared to the number obtained after students were given a bouncy band to use to help them sustain attention. The results from the pre and post observations, ($t(23)=6.336$, $p<.05$) indicated that there was a decrease of off-task behaviors once students started using the bouncy band as a strategy to help them stay on-task. Pair 5 in Table 1 and Table 2 presents these findings.

Table 2 *Pre and Post Off-Task Observations*



Interviews took place at the end of the school year. Participants were asked to reflect on 5 statements (1-Bouncy bands are fun., 2-Bouncy bands help me focus in class., 3-Bouncy bands let me move so I can relax better., 4-Bouncy bands make it easier to do my work., and 5-Bouncy bands help me feel calmer when I take tests.) which allowed students to elaborate on their perceptions regarding the effectiveness of the bouncy bands. Results from the interviews suggested that most of the participants believed that the bouncy bands were fun, helped them to focus, relax, and feel calmer when taking tests. Table 3 provides insight into the participants' perceptions.

Table 3 *Participants Perceptions of Effectiveness of the Bouncy Bands*



DISCUSSION

Results from the current study supported the original hypothesis, as bouncy band usage was found to have a significantly positive effect on maintaining attention. Additional variables measured in the current study including listening and following directions were also found to improve following use of the bouncy bands. While each of these variables had a significant effect on bouncy band usage, there was no significant effect on self-control.

Strengths and Limitations

The current study examined on-task behaviors in a group of 24 elementary school students. The small sample size of 24 is low in power, as the sample size should be at least 41 participants to achieve an effect size of .50. Even so, with only 24 participants, significant results were still found in the areas of attention, listening and following directions. This strongly suggests that bouncy bands are highly effective, since there is less of a chance of finding significant results with a low power.

In addition, the majority of students in the current study had a diagnosis of ADHD.

Future Directions

While attentional issues are now being recognized at a younger age, it is still common for older students to be undiagnosed or misdiagnosed. The current study focused on students in grades 1-5 only. Future studies could expand upon the current study by examining the effects of bouncy bands in middle, or even high school. Furthermore, while bouncy bands have been found to be beneficial in several areas of attention and on-task behavior, (Bisson et al., 2017) they are only implemented in few classrooms. Due to the benefits that have been found, it may be of interest for school administrators to seek ways of acquiring funding to purchase bouncy bands for classrooms.

Implications for Counselors

The significance of bouncy bands improving attention, listening and following directions in the current study provide a promising foundation for school counselors. Increased communication between classroom teachers and school counselors regarding students with attentional issues is likely to contribute to overall improvement in the school environment. Based on current findings, students engaged in seated movement techniques are more likely to be actively engaged in the classroom and thus, succeed in various academic tasks (Seifert & Metz, 2017;

Adopting bouncy bands for students in the classroom is likely to have numerous benefits in school counseling related activities. Student interviews in the current study suggest that bouncy bands help students to relax and feel calm. Since students will be more focused and calm, they are likely to be more mindful and receptive to learning social skills and behavioral strategies. Thus, overall mental health is likely to be improved. In addition, increased focus for

these activities could benefit these students in many social situations. A student seeking school counseling services is likely to be able to express his/her needs more clearly if he/she is more focused. In addition, the current study suggests that implementing bouncy bands results in improved listening skills in students. These skills are likely to support relationship building among students, as listening skills are critical to building relationships with peers.

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