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Original Article

On-task behavior of elementary students during movement integration

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Abstract:
Problem Statement: Children engaged in prolong academic instruction often become off-task. Participating in short bouts of movement integration activities is effective in reducing off-task behavior in children. Systematic observation is considered a reliable and valid method to assess students' behavior in school settings. However, there is a lack in research using the systematic observation method to examine students' on-task and off-task behavior. Purpose: The purpose of this study was to examine students' on-task behavior using systematic observation following movement integration activities. Methods: 233 students from four elementary schools (11 classrooms) participated in movement integration. The classroom teachers implemented the movement integration activities in their classroom once a day for four weeks. On-task behavior was measured using systematic observation during a four-week baseline and four-week intervention procedure. Mean percentage on-task behavior between baseline and intervention was compared using a two-way repeated measures ANOVA. Results: Students' on-task behavior decreased significantly ($p = 0.002$) from (91.5 ± 2.5) to (82.8 ± 7.2) after prolonged engagement in classroom instruction. Conversely, there is no significant change in students' on-task behavior during movement integration activities from (91.3 ± 5.4) to (92.4 ± 3.4). Discussion: Students' on-task behavior decreased by 8.7% during baseline, whereas their on-task behavior maintained during intervention where teachers implemented movement integration activities. Conclusion: Considering the benefits of movement integration activities and the ease of implementation, it is recommended that teachers be provided with professional development to easily implement movement integration in their classrooms.
Key words: off-task behavior, elementary school, classroom-based activity, systematic observation.

Introduction

There is a nationwide call to increase children and youth's physical activity levels (Carson, Castelli, Beighle, & Erwin, 2014). Based on the Comprehensive School Physical Activity Program (CSPAP) model, schools are ideal places to promote physical activity through physical education, physical activity during, before and after school, staff involvement, and family and community engagement (Carson et al., 2014). One type of physical activity promotion strategy during the school day is movement integration (MI) (Erwin, Beighle, Carson, & Castelli, 2013). MI is physical movement at any intensity that is integrated with academic subjects either between or during instruction, or movement breaks without an academic focus in the classroom (Webster, Russ, Vazou, Goh, Erwin, 2015).

Short bouts of MI has been shown to effectively improve or maintain students' on-task behavior in the classrooms (Goh, Hannon, Webster, Podlog, & Newton, 2016; Grieco, Jowers, & Bartholomew, 2009; Mahar et al., 2006; Webster, Wadsworth, & Robinson, 2015). For instance, students' on-task behavior has shown improvement by 7-8 % (Goh et al., 2016; Mahar et al, 2006) and 16% (E. Webster et al., 2015) after engagement in MI. Long-term engagement in MI has also shown an approximate 50% improvement in on-task behavior of students from low-income families at 12 weeks (Burns, Brusseau, Fu, Myrer, & Hannon, 2016). Engagement in MI to improve on-task behavior is also most effective with students who displayed the most off-task behavior (E. Webster et al., 2015). These studies primarily used the systematic observation methodology to examine students' on-task behavior but differed in the length of observation and instruction periods. For instance, a 45-minute period was used in study by Grieco et al. (2009), whereas a 75-minute period was used in studies by Goh et al. (2016), Mahar et al. (2006), and E. Webster et al. (2015).

Though students' on-task behavior improved after engaging in MI, it remains inconclusive whether children would become off-task after long periods of academic instruction. There is a reduction in on-task behavior in students after prolonged engagement in academic instruction (Grieco et al., 2009; Goh et al., 2016). However, in other studies (Mahar et al., 2006; E. Webster et al., 2015), there was no change in students' on-task

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behavior during typical academic instruction that lasted 75 minutes. It warrants further investigation into students' on- and off-task behavior because off-task behavior of students in classrooms disrupts valuable learning time and causes stress in teachers (Burke, Oats, Ringle, Fichtner, & DelGaudio, 2011).

Therefore, this study further examined students' on-task behavior after prolonged instruction using the systematic observation methodology. Systematic observation is known to be the most effective methodology to measure students' behavior because of its ability to provide rich data on the context, along with high internal validity, and low participant burden (McKenzie & van der Mars, 2015). Based on previous research, we hypothesized that students' on-task behavior would decrease after prolonged academic instruction and increase after participating in MI.

Material & methods

Participants

The MI activities were implemented in four elementary schools in a large Southwestern city in the United States. 233 elementary school students from 11 classrooms ranging from 1st to 6th grades participated in the MI activities. Three of the four schools are Title 1 schools located in low socio-economic status neighborhoods. There was an average of 21 students to one teacher in the participating classrooms at each school. Following institutional review board and school district approval, written assent and consent were obtained from the students and parents, respectively, prior to data collection. Data were collected in spring 2014.

Movement Integration Teacher Training

The researchers collaborated with the school physical educators in providing training to the classroom teachers to implement the MI activities in the four schools. The physical educators attended a one-hour workshop on implementing MI organized by the researchers. The workshop, held in the university included rationale for MI and hands-on experience in implementing MI. Resources (e.g., TAKE 10! and Energizers) were provided to the physical educators at the end of the workshop. The physical educators recruited interested classroom teachers to implement the MI activities in their classrooms. Eleven classroom teachers responded to implementing MI activities in their classrooms. Subsequently, the physical educators worked independently with the classroom teachers on implementing the MI activities and provided resources that they received during training, to aid in the implementation. Each classroom teacher implemented one MI activity (lasting about 15 minutes) per day for 4 weeks in their classroom. The classroom teachers consulted with the physical educators in implementing suitable MI activities in their classrooms. For instance, if a teacher was teaching a math lesson on addition, the physical educator helped the teacher choose an activity from the TAKE 10! program where students pretended to hold a jump rope and answered the math addition problems while jumping.

Instruments and Procedures

Systematic observation methodology was used to measure on-task behavior based on protocols from previous research (Goh et al., 2016). Five primary observers were trained on the observation protocol while the first author served as the secondary observer for the purpose of interobserver reliability. Complete definitions of on- and off-task behavior were given to the observers to enhance agreement. Specifically, on-task behavior included students following class rules and engaging in appropriate or assigned tasks, whereas off-task behaviors were students dozing off, putting their head on the table, doing unassigned or inappropriate tasks, and looking at or talking to other students (Grieco et al., 2009). For the present study, the first author co-observed 20% of the classes with the primary observers, with results showing a 97.5% rate of agreement between observers across observations. Interobserver reliability was calculated using procedures from a previous study (Mahar et al., 2006).

A four-week baseline and four-week intervention procedure was used in the study. The teachers carried out their lessons as usual during baseline (no MI activities), whereas teachers implemented the MI activities once a day during the intervention. Four observations during baseline (once a week for 4 weeks) and four observations (once a week for 4 weeks) during MI activities were conducted in each of the 11 classrooms. A total of 88 observations were carried out during the study. During baseline, the observers observed the class for 15 minutes, then after a 15-minute waiting interval, observers observed the class for another 15 minutes. During MI activities, the observers observed the class for 15 minutes, then the teachers implemented the MI activities, and finally the observers observed the class for another 15 minutes. During each observation, the researchers used a 5-second interval recording procedure. Specifically, the researchers listened to a pre-recorded audio file that signaled 5 seconds for observing and coding on- or off-task behavior of each student. Once a student was observed and coded, the researchers moved on to the next student. The researchers continued with the procedure until all students were observed and coded at least once during the 15-minute observation period. For example, in a class of 20 students, each student would be observed and coded approximately 9 times during the 15-minute observation period.

Data Analysis

Data were entered and results generated using SPSS (Version 24.0, Chicago, IL). The number of intervals in which on-task behavior occurred during each 15-minute observation period was summed and divided by the total number of intervals and then multiplied by 100 to produce the mean percentages of on-task behavior for each class. Using a two-way repeated-measures ANOVA, mean percentages on-task behavior were compared during baseline (pre-inactive versus post-inactive) and during intervention (pre-active versus post-active). Bonferroni procedure was used to adjust for significance levels due to multiple comparisons.

Results

The two-way repeated measures ANOVA indicated a significant time × period interaction [$F(1, 10) = 12.85$, $p = .005$] of students' on- task behavior following the MI activities, with medium effect size ($ES = .562$). Results also revealed a significant reduction ($p = 0.002$) in mean percentage on-task behavior during baseline from 91.5 ± 2.5 (pre-inactive) to 82.8 ± 7.2 (post-inactive). There were no significant changes in mean percentage on-task behavior during MI activities from 91.3 ± 5.4 (pre-active) to 92.4 ± 3.4 (post-active). Overall, students' on-task behavior decreased by 8.7% during baseline, whereas their on-task behavior maintained during MI activities.

Discussion

The purpose of the present study was to investigate students' on-task behavior after participation in MI activities, using systematic observation. The results from this study corroborate those of other studies, in that students became more off-task after engaging in long periods of classroom instruction (Goh et al., 2016; Grieco et al., 2009), while students' on-task behavior maintained after participating in a short bout of MI activities (Grieco et al., 2009). However, in studies by Mahar et al. (2006) and E. Webster et al. (2015), students did not become off-task during prolonged engagement in classroom instruction, while students' on-task behavior improved after an activity break is provided. Results from this study suggest that if the class is initially off-task, the class will remain off-task through long engagement in academic instruction. Conversely, if the class was initially on-task, they will become progressively off-task if no physical activity breaks are provided. Most of the off-task behaviors observed in this study were students gazing off, talking to other students, and doing work not intended for the class instruction. Consequently, an initially off-task class would benefit from a short bout of physical activity to help them become more on-task and an initially on-task class would remain on-task after participating in MI activities. MI can also be used as an incentive to direct students' attention and energy from the usual classroom instruction to improve their on-task behavior. Besides MI helping with management of students' behavior and focus in the classroom (Cothran, Kulinna, & Garn, 2010; Gibson et al., 2008), teachers have also found that it became easier to get the students to focus on their academic work once they were accustomed to the MI procedures (McMullen, Kulinna, & Cothran, 2014).

In previous research, it was found that 10-minute and 20-minute MI breaks were enough to obtain improvements in students' performance in math (Howie, Schatz, & Pate, 2015). Likewise, future research can include examining the length of MI activities that could affect students' on-task behavior in the classroom. Having the physical educator in the school to support the implementation of MI activities appears to be a sustainable strategy to implement MI activities in schools. Collaboration among teachers (i.e., teachers with physical educators) also strengthens teachers' collective efficacy beliefs on the capability of peers and teachers to implement MI activities continuously (Goh, Hannon, Webster, & Podlog, 2017; Webster, Erwin, & Parks, 2013). Importantly, peer mentoring through the physical educator following the initial teachers' training has been found to be effective in promoting physical activity interventions in elementary schools. (Miller, Christensen, Eather, & Lubans, 2015; Miller et al., 2016).

Though teachers find MI easy to implement, time constraints (i.e., preparing and allocating time for MI) have been one of the main barriers to teachers implementing MI activities in schools (McMullen, Martin, Jones, & Murtagh, 2016; Goh et al., 2017; Tsai, Boonpleng, McElmurry, Park, & McCreary, 2009). Future research can examine implementation of MI activities through university-school collaboration (Webster, Beets, Weaver, Vazou, & Russ, 2015). For example, a university can collaborate with schools to allow pre-service teachers to provide MI activities in the classrooms. In this instance, the preservice teachers can prepare the MI lesson ahead of time and deliver it in classroom a few times a week. Furthermore, the university can support the school by providing professional development workshops to equip the teachers with skills to implement MI in their classrooms. Such collaboration will be beneficial to both universities and schools.

Conclusions

Children become off-task as they sat through a prolonged period of classroom instruction, whereas a short bout of MI helped to maintain their on-task behavior. Consider the ease of implementation of MI activities in school and benefits of MI activities to reduce off-task behavior of students after prolong seat work in the classroom, MI activities should be provided to students regularly throughout the school day. Future consideration can include policy change requiring MI activities in schools that could significantly sustain and influence the culture of physical activity during the school day. Additionally, equipping teachers with the

necessary skills through professional development to implement MI could further advocate for the sustainability of MI activities in the schools. Consequently, the children may benefit from having scheduled MI activities throughout the school day.

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