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Three Studies Concerning Movement Integration In Low Socioeconomic Elementary School Classrooms

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by

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Dedication

To my beautiful, supportive wife Jennifer, my dad, two older brothers, and all others who provided me with support and encouragement during this process. Without these people, completing my Ph.D. would not have been possible.

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Abstract

This dissertation contains three studies that advance the knowledge base on classroom movement integration (MI), specifically within low socioeconomic (SES) schools. Study One examined the current level and types of MI being utilized in a low SES school district. Study Two and Study Three focused on one low SES school. Study Two compared movement breaks in traditional general education classrooms to other in-school PA opportunities (i.e., time in physical education, recess, and movement facilitative classrooms) regarding their associations with student off-task behavior, while Study Three evaluated an MI training delivered to classroom teachers.

For Study One, classroom teachers (N = 48) in eight elementary schools in a rural, low SES school district in the southeastern U.S. were systematically observed using the System for Observing Student Movement in Academic Routines and Transitions (SOSMART). Trained observers (N = 10) observed the teachers' classrooms randomly and on unannounced days over one academic calendar year. Descriptive statistics were calculated for the frequency and types of MI being used. The majority of teachers (*n=44*) were observed using MI. Of the 9398 individual observation scans across the year, students engaged in movement 41.3% of observed time. Student movement was observed to be teacher directed 14.4% of scans and non-teacher directed 26.9% of scans. Non-teacher directed movement consisted mostly of transitions (M = 99.5) in which

movement occurred as a result of pre-established classroom rules, protocols, and organization. This is one of the first studies to provide objective information about MI in a low SES school district. These descriptive data lay the groundwork for future correlational and experimental research that can lead to the development of effective intervention design and teacher professional development training to increase MI use in low SES school contexts.

Systematic observation protocols for student off-task behavior and teacher redirects were developed for Study Two. For four non-consecutive weeks across one academic year, observations of off-task behavior, teacher redirects, and PA opportunities across the school day were conducted with students from elementary classrooms (N=6) in one low SES school. Percent agreement between codes for off-task behavior and redirects was calculated to determine the consistency of the two measures. A multi-level mixed effects logistic regression explored the likelihood of a teacher redirect at 5, 10, 15, 30, and 60 minutes post each PA opportunity and identified the association of student participation in the different school-based PA opportunities to the occurrences of students' off task. Teacher redirects were found to be a suitable proxy for measuring occurrences of student off-task behavior. The only PA opportunity associated with teacher redirects was movement breaks in traditional classrooms, where redirects were found to be less likely to occur at all post-PA opportunity time points. Findings of this study provide a teacher-driven measurement protocol for examining off-task behavior and further support the benefits of classroom-based PA for reducing children's off-task behaviors during regular classroom time.

The purpose of Study Three was to evaluate an MI training for classroom teachers at the school from Study Two. Participants in this study were classroom teachers (*n*=6), the activity lab supervisors (*n*=2), and the school principal (*n*=1). The training was recorded compared to recommended best practices for teacher professional development, Less than half (M = 42%) of best practices were evident in the training. Interviews with participants led to the identification of three themes, each with two subthemes concerning the strengths and weaknesses of the training: a) training purpose, b) challenges, and (c) future training recommendations. It is important for future research to align MI training design and resources provided with current recommendations for professional development and to ensure stakeholder perceptions of MI trainings are identified and utilized.

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Chapter 1

Introduction

Participation in physical activity (PA) plays an important role in the physical, social, and mental development of children (U.S. Department of Health and Human Services [USDHHS], 2008). Regular participation in PA helps in building and maintaining healthy bones, improving strength and endurance, reducing anxiety and stress, and increasing self-esteem (USDHHS, 2008). Despite the well-documented benefits of PA, only 42% of children (6-11 years old) and 8% of adolescents achieve the national recommendations for PA (Troiano et al., 2008). Additionally, more than one third of children and adolescents are classified as overweight or obese (Ogden, Carroll, Kit, & Flegal, 2015). As a result, national initiatives such as "Let's Move" pioneered by former first lady Michelle Obama and "NFL Play 60" founded by the National Football League (NFL) were created with the common goal of increasing children's PA participation.

Schools have been targeted as a natural setting to promote PA in children and adolescents due to the high level of access schools have to children, the large amount of time children and adolescents spend in school, and the already existing infrastructure for PA promotion (e.g., professionals trained to work with youth, space for engaging in PA; Pate et al., 2006; Institute of Medicine [IOM], 2013). In 2008, the National Association for Sport and Physical Education [NASPE] (now named the Society of Health and

Physical Educators [SHAPE] America) advocated for comprehensive school PA programs (CSPAP; NASPE, 2008). The current iteration of this model includes the following five components: (a) physical education, (b) PA during school, (c) PA before and after school, (d) staff involvement, and (e) family and community engagement (Centers for Disease Control and Prevention [CDC], 2013; SHAPE America, 2015). This approach was developed to target two overarching goals: (a) to provide a variety of school-based physical activities to enable all students to participate in 60 minutes of moderate-to-vigorous PA each day and (b) to provide coordination among the CSPAP components to maximize understanding, application, and practice of the knowledge and skills learned in school physical education (CDC, 2013; NASPE 2008). The IOM (2013) recommends that children accumulate half of the targeted 60 minutes of daily PA during regular school hours.

The CSPAP framework identifies many different settings for PA opportunities to occur throughout the school day (e.g., physical education, classrooms, recess). One of these settings is the general education classroom, in which a classroom teacher leads instruction for children in a range of subjects, such as Math, English Language Arts, Science, and Social Studies. Within this environment, strategies designed to help children accumulate the recommended 30 minutes of daily PA during school can be supported by movement integration (MI), which is defined as infusing PA, at any level of intensity, during normal classroom time (Webster, Russ, Vazou, Goh, & Erwin, 2015). MI has garnered increased attention as a viable strategy for making meaningful contributions to children's school-based PA (Benden, Zhao, Jeffrey, Wendel, & Blake, 2014; Erwin, Beighle, Morgan, & Noland, 2011; Goh et al., 2014), as well as gains in children's time

on-task in the classroom (Goh, Hannon, Webster, Podlog, and Newton 2016; Grieco, 2011; Grieco, Jowers, & Bartholomew, 2009; Mahar et al., 2006; Mullender-Wijnsma et al., 2015; Riley, Lubans, Holmes, & Morgan, 2015) and academic performance (Goffreda, 2010; Howie, Schatz, & Pate. 2015; Reed et al., 2010).

Despite the numerous benefits of MI, little objective research has been conducted to investigate the extent or nature of MI in schools or the relationships of MI to children's PA and school performance (Webster et al., 2015). Objectively measuring MI is an important step forward in research on MI, and CSPAPs more generally, which has relied mostly on teacher self-reports (Russ, Webster, Beets, & Phillips, 2015; Russ, et al., 2017). Direct observation of teachers' use of MI and the contribution of MI to children's PA and school performance, particularly in low socioeconomic (SES) contexts where relatively little MI may occur (Turner & Chaloupka, 2016), is needed to build a robust descriptive-correlational research base for experimental research. Furthermore, previous studies have given relatively little attention to evaluating MI trainings for teachers. Evaluating such trainings is critical to advancing the evidence base to inform best practices in teacher education related to MI.

This dissertation consists of three original research manuscripts that focus on MI in elementary schools within low SES communities. The first manuscript is a descriptive examination, via systematic observation, of classroom teachers' use of MI in a low SES school district. In the second manuscript, associations among directly observed school-based PA opportunities, children's off-task behavior, and teacher redirects are examined in a low SES school. The third manuscript evaluates a professional training provided to classroom teachers to implement MI within a low SES school. The overarching

framework used across all three studies is the CSPAP model, specifically the PA during school component of the program. Below are the purposes and research questions for each study.

Study purposes and research questions

Study One. The purpose of Study One was to examine, via systematic observation, the extent and nature of MI in elementary classrooms within a low SES school district. The specific research questions were:

- How much MI occurs in low SES elementary schools?
- What MI strategies are being employed in low SES elementary schools?

Study Two. The purpose of Study Two was to examine the association of school-based PA opportunities (i.e., movement breaks in traditional classrooms; time in movement facilitative classrooms; time at recess; and time in physical education) to student off-task behavior and teacher redirects within a low SES school. The specific research questions were:

- Is the use of scan protocol a viable substitute for current methods of measuring student off-task behavior?
- Is teacher redirects a suitable proxy for measuring student off-task behavior?
- What is the association of different the PA opportunities across the school day to teacher redirects of student off-task behavior?

Study Three. The purpose of Study Three was to evaluate a professional development training provided to teachers in a low SES school to implement MI within a kinesthetic classroom and action based learning labs. The specific research questions were:

- What is the level of fidelity between the training and recommended best practices for teacher professional development?
- What are the classroom teachers', the kinesthetic classroom/activity lab supervisors', and the school principal's perceptions of the training?

Chapter 2

Literature Review

This chapter will (a) discuss the need for promoting children's physical activity (PA); (b) highlight the distinct importance of PA promotion for children from low socioeconomic (SES) communities, (c) provide an overview of the comprehensive school PA program (CSPAP) model; (d) describe classroom movement integration (MI) and summarize the related research; (e) review studies of children's PA and on-/off-task behavior; (f) canvas the best practice recommendations for teacher professional development trainings; and (g) identify gaps in the related research.

Need for Promoting Children's PA

The benefits of PA have been well documented and play a significant role in children's physical, social, and mental health (U.S. Department of Health and Human Services [USDHHS], 2008). Increased PA in children is associated with reduced risk of obesity and chronic diseases such as cardiorespiratory disease and diabetes, increased physical fitness, reduced anxiety and stress, and increased self-esteem (USDHHS, 2008). Participation in PA may enhance cognitive functioning (Hillman et al., 2012) and improve academic achievement (Basch, 2011). Participation in PA is important to students' school performance, including concentration, attentiveness, and time on task (Centers for Disease Control and Prevention [CDC], 2015). Due to its numerous health and academic benefits, participation in PA is recommended by various public health and educational advocates. However, only 42% of United States children (6-11 years old)

achieve the recommended 60 minutes of daily PA and only 8% of adolescents achieve this goal (Troiano et al., 2008). In 2012, more than one third of children and adolescents were overweight or obese (Ogden, Carroll, Kit, & Flegal, 2015). These statistics are concerning to public health advocates and policy officials because childhood obesity-related health problems have a high probability of continuing into adulthood (Daniels, 2006). Participation in PA is a modifiable risk factor that should be viewed as preventive medicine for school-aged children (Warburton, Nicol & Bredin, 2006; Haskell et al., 2007).

Distinct Importance of Promoting Children's PA in Low SES Communities

A central goal of the National Health Objectives (Healthy People 2020) is to eliminate health disparities and to achieve health equity. This is a result of findings that underserved, low SES populations do not engage in adequate amounts of PA (Conn & Sells, 2016). Individuals from a low SES have been found to report lower levels of PA (Giles-Corti and Donovan, 2002), a higher risk of chronic illnesses such as obesity and diabetes (Everson, Maty, Lynch, and Kaplan, 2002), a higher risk of mortality (Chapman, Fiscella, Kawahi, and Duberstein, 2009). Potential reasons for these health disparities include less access to facilities (e.g., parks, recreation facilities), lower levels of education (i.e., lack of knowledge about health and health behaviors), and higher levels of stress (Bukman et al., 2014; Chapman et al., 2009; Moore, Roux, Evenson, McGinn, & Brines, 2006). Another barrier that limits PA participation is perceptions of a lack of safety in these low SES environments (Wilson, Kirtland, Ainsworth, & Addy, 2004).

Although low SES populations' participation in PA is well-documented as a healthy disparity, research to develop interventions targeting this population are limited

(Mendoza-Vasconez et al., 2016). Of the interventions that have targeted the low SES populations in PA promotional efforts, most have identified schools and clinics in disadvantage areas or focused on environmental changes in low SES neighborhoods (Mendoza-Vasconez et al., 2016). It is crucial for future research efforts to focus on underserved populations such as low SES to reduce the health disparity associated with these populations and PA participation.

CSPAP Model

Within the school setting, traditionally, physical education alone has been tasked with providing the majority of PA opportunities to school-aged children. Even though quality physical education can be effective in increasing PA (McKenzie et al., 2004; Pate et al., 2006; Sallis et al., 1997) physical education is highly unlikely to fully address the PA needs of school-age children (Fox et al., 2004). One barrier to student participation in physical education is policies that emphasize increased academic time and as a result, limit the amount of time allotted for physical education (IOM, 2013). Nearly half (44 percent) of school administrators report cutting significant amounts of time from physical education and recess as a result of educational and academic policy (Kohl & Cook, 2013). Thus, there is an increased need for school-aged children to be provided with more opportunities to participate in PA.

National recommendations call for a whole-of-school approach to PA promotion to facilitate active school communities (IOM, 2013). A leading model of a whole-of-school approach is a CSPAP (CDC, 2013; National Association for Sport and Physical Education [NASPE], 2008a). A CSPAP is designed to achieve two main goals: (a) to provide a variety of school-based physical activities to enable all students to participate in

60 minutes of moderate-to-vigorous physical activity (MVPA) each day and (b) to provide coordination among the CSPAP components to maximize understanding, application, and practice of the knowledge and skills learned in physical education so that all students will be fully physically educated and well-equipped for a lifetime of PA (CDC, 2011; NASPE, 2008). The CSPAP model identifies five components to focus PA promotional efforts: (a) physical education, (b) PA during school (beyond physical education), (c) PA before and after school, (d) staff involvement, and (e) family and community engagement (CDC, 2013; SHAPE America, 2015).

Physical education is an academic subject that serves as the foundation of a CSPAP by providing students with opportunities to learn knowledge and skills necessary to establish and maintain active lifestyles for a lifetime (CDC, 2013). Quality physical education meets all student needs, is enjoyable for all students, keeps students active for most of the class time, teaches self-management, teaches skills to maximize movement proficiency, emphasizes knowledge and skills for a lifetime of PA, and has the ability to increase student participation in PA, increase physical fitness, and enhance student knowledge and skills about why and how they should be physically active (CDC, 2013).

The other components of a CSPAP should be designed to expand children's daily PA opportunities as well as to reinforce the physical education program (Webster, Stodden, Carson, Egan, & Nesbitt, 2016). During the school day, schools can promote student PA by providing space, facilities, and equipment in organized and semi-structured activities that promote student interest and enjoyment in PA (CDC, 2013). Examples of PA during the school day include recess, classroom-based PA (e.g., brain breaks, active lessons), and daily school-wide PA during morning/afternoon

announcements. PA before and after school provides opportunities for all students, including those with special needs, to (a) practice what they have learning in physical education, (b) work toward the nationally recommended 60 minutes of daily PA, (c) become more adequately prepared for learning, (d) engage in safe social, and supervised activities, and (e) help students identify activities they enjoy and may have a desire to continue throughout their life (CDC, 2013). Examples of PA before and after school are intramural programs, running/biking clubs, or a walking school bus that allows students to walk to and from school. Staff involvement in a CSPAP can create a school community that makes positive contributions to the overall school culture regarding PA and provide a support system in school that encourages PA participation in both students and teachers (CDC, 2013). The staff involvement component of a CSPAP targets improving school staff health, promoting staff commitment to healthy practices, and increasing staff support for and engagement in promoting children's PA (CDC, 2013). An example of staff involvement in a CSPAP is to create a teacher fitness club that meets after school. Similarly, family and community engagement provide a support system outside the school setting that creates a connection between school-based and family-/community-based PA opportunities (CDC, 2013). Lee et al. (2010) found that youth participation in PA is influenced by participation and support of parents and siblings. Examples of this component include a monthly family PA night or a family PA program that helps students and other family members track their own PA.

MI

Integrating movement opportunities within general education classrooms is a commonly recommended strategy to increase children's PA during school hours (CDC,

2013; IOM 2013; Pangrazi, Beighle, Vehighe, & Vack, 2003). MI is defined as infusing PA, at any level of intensity, into regularly scheduled classroom time (Webster, Russ, Vazou, Goh, & Erwin, 2015). MI strategies fit into two different components of the CSPAP model: during school PA and staff involvement. When school staff (e.g. administrators, teachers, other staff) participate in a CSPAP, the prevalence of PA opportunities has the potential to increase exponentially. Staff involvement and training can increase teacher knowledge about the benefits of MI, which can in turn promote more MI during the school day (Eseryel, 2002).

MI has been associated with increases in PA measured in step counts (Erwin, Abel, Beighle, & Beets, 2011; Goffreda et al., 2010; Mahar et al., 2006; Robinson, Wadsworth, Webster, & Bassett, 2014; Stewart, Dennison, Kohl, & Doyle, 2004). Along with increases in PA, MI has also been associated with improvements in students' academic achievement (Adams-Blair & Oliver, 2011; Donnelly et al., 2011; Fedewa, Ahn, Erwin, & Davis, 2015; Reed et al., 2010), reading comprehension (Uhrich & Swalm, 2007), mathematic achievement (Fredericks, Kokot, & Krog, 2006; Fedewa et al., 2015), and classroom behavior (Godffreda, 2010). Whereas most studies of MI focus on teacher-enacted strategies to increase children's PA, recent research on the use of PA facilitative equipment (e.g. stand-biased desks, stability balls) to incorporate MI has shown similar benefits with student PA (Benden et al., 2014), cognitive achievement (Fedewa, Ahn, Ewrin, & Davis, 2015), and classroom behavior (Burgoyne & Ketcham, 2015).

Given the benefits of MI, it is important to determine the extent to which its use is commonplace. A survey study using a nationally representative sample found that

approximately 72% of elementary schools reported integrating PA into classroom activities and 76% of schools reported implementing classroom activity breaks (Turner & Chalupka, 2016). The survey also found that lower SES schools were significantly less likely to report using MI than higher SES schools. Studies have identified numerous factors associated with classroom teachers' use of MI. Overall, classroom teaches value PA for their students (Huberty, Dinkel, Coleman, Beighle, & Apenteng; 2012; Stylianou, Kulinna, & Naiman, 2016) and are willing to promote PA during regular classroom time (Parks, Solmon, & Lee, 2007). Teachers have also expressed a willingness to learn more and improve their abilities to use MI through support and training. (Benes, Finn, Sullivan, & Yan, 2016). Teacher perceived barriers to MI have been identified as a lack of time (Stylianou, Kulinna, & Naiman, 2016), classroom management concerns (Stylianou, Kulinna, & Naiman, 2016), limited curricula space (Usher & Anderton, 2014;), lack of priority placed on PA (Usher & Anderton, 2014), inadequate access to facilities/lack of physical space (Usher & Anderton, 2014), On the other hand, teacher perceived facilitators of MI have been identified as training (Usher & Anderton, 2014), administrative support (Stylianou, Kulinna, & Naiman, 2016; Usher & Anderton, 2014), and additional resources (Stylianou, Kulinna, & Naiman, 2016).

PA and On-/Off-Task Behavior

Research highlighting the academic benefits of MI could be particularly important to increasing teachers' buy-in and use of MI. According to Mahar (2011), teachers especially value on-task behavior as an outcome of their work because they understand how important it is to their students' academic performance. As a result, seeing the positive results of MI on children's on-task behavior can be a powerful motivational tool

for teachers to adopt MI. This idea aligns with research that suggests the key element in significant change in teachers' attitudes and beliefs is clear evidence of improvement in the learning outcomes of students (Guskey, 2002). McMullen, Kulinna, and Cothran (2014) interviewed twelve elementary and high school classroom teachers to explore the teachers' perceptions and preferences related to incorporating classroom PA breaks. Three overarching themes emerged: the need for and threats to classroom control, a preference for breaks with connections to academic content, and the importance of implementation ease and student enjoyment.

The influence of PA on children's on-task behavior has begun to receive more attention in intervention research as results continue to show a positive relationship between PA and on-task behavior Grieco et al. (2009) examined the effects of physically active classroom lessons and body mass index (BMI) category on time on task (TOT) in elementary school children (N = 97; Mage = 8.7 ± .41) in Central Texas. Student grade levels were not reported. Participants were approximately 55% female and 70% white. SES of school or participants was not reported. Teachers received two trainings: full day (8 hour) training on lesson implementation at the beginning of the year and a refresher training halfway through the school year. However, the content and learning experiences provided during these trainings were not reported. Teachers were provided with lesson plans, which outlined proper procedures, equipment, and space requirements necessary to conduct lessons Trainings were designed to ensure lesson consistency across all classrooms. Direct observations were conducted to ensure proper lesson implementation; however, the frequency, duration, and results of these observations were not reported. Teachers tracked implementation by reporting the frequency of their use of active

lessons. Researchers established a criterion goal of implementing one active lesson on 80% of school days. Results indicate implementation rates of active lessons were approximately 92%. Teachers also completed a self-report checklist to document lesson time, duration, quality, predicted future use, overall rating, PA intensity, and student enjoyment. However, these results were not reported.

TOT was assessed through direct observations before and after physically active classroom lessons compared with inactive classroom lessons. On-task behavior was defined as any behavior in which a student is attentive to the teacher or actively engages in the appropriate task, as assigned by the teacher, while off-task behavior was defined as any behavior that did not fall under the specifications for on-task behavior. TOT was calculated using momentary time sampling for each student by dividing the number of on-task observations by the total number of observations per student. Students were observed for 15 minutes before the beginning of the physically active lesson and 15 minutes after the completion of the lesson. With 180 15-minute observations, each student was observed between 16 and 22 occasions. Two observational days were required for each student. Results indicated that for students that received inactive classroom lessons, TOT percentage decreased by approximately 7% in the normal weight BMI group, 14% in the at risk BMI group, and 21% in the overweight BMI group in group. Conversely, for students that received active lessons, TOT percentage increased by approximately 3% in the normal weight BMI group, 4% in the at risk BMI group, and 3% in the overweight BMI group. These findings support the use of physically active classroom lessons in increasing all students' TOT.

In a follow up study, Grieco (2011) examined the levels of PA required to elicit a response in TOT. Participants (N = 320; Mage = 9.5 ± .41) were in 3rd-5th grade in two elementary schools in Central Texas. As in Grieco (2009), participants were approximately 70% white and 55% female. SES of the school or the participants was not reported. In each grade level, the children were randomly assigned to one of four groups: inactive lesson, sedentary academic game, low-to-moderate intensive PA (LMPA) game; and moderate-to-vigorous PA (MVPA) game. On-task behavior was defined and measured in the same manner as Grieco et al. (2009). However, off-task was defined as actions whereby a student was disengaged or distracted from the assigned task. To ensure implementation fidelity of treatments, the lead researcher implemented all conditions to classes. Results showed a 15% decrease in TOT in the inactive lesson group, a 2% increase in TOT in the sedentary active game, a 10 % increase in TOT in the LMPA game group, and a 16% increase in the MVPA game group.

Goh, Hannon, Webster, Podlog, and Newton (2016) examined the effects of a classroom PA intervention called Take 10! on on-task behavior in elementary school students' (N = 210) in 3rd-5th grade in a Southwestern city in the U. S. School demographics consisted of 57% white. Specific participant demographics (e.g. age, race. socioeconomic status) were not reported. Take 10! is a classroom-based PA promotion curriculum developed by the International Life Sciences Institute Center for Health and Promotion (ILSI CHP). Goh et al. (2016) evaluated the implementation of Take 10! in a 12-week program (4-week baseline and 8-week intervention) to determine its effects on on-task behavior measured through direct observation. The primary author trained the teachers for approximately one hour. Training included presenting teachers with

information about the obesity epidemic and a rationale for incorporating PA into the curriculum, dividing the teachers into groups by grade level, and having each group select a Take 10! activity and lead the entire group in the activity. On-task behavior was defined as verbal or motor behavior that follows class rules and is appropriate to the learning situation and measured using systematic direct observation and momentary time sampling in which behaviors observed were recorded at the end of the interval. Off-task behavior included but was not limited to students gazing off, placing their head on the desk, yawning, reading or writing inappropriate or unassigned material, looking at other students when not part of a given assignment, and leaving the desk. Observation protocols were adapted from Mahar et al. (2006) and Greico et al. (2009). All students were observed during each observation period, observation time intervals were reduced from 10 to 5 seconds, and the observation period was extended from 15 minutes to 30 minutes. Teachers were informed of the day of the week and time of day that observers would be in their classroom. Results indicated an increase of approximately 7% in mean percentage of on-task behavior when comparing pre-and post- intervention percentages while on-task behavior decreased approximately 7% in the control group. These results suggest the "Take 10!" program had a positive effect on increasing on-task behavior. Implementation fidelity was conducted through direct observation on observation days and through a weekly teacher self-report checklist to determine the number of times the activities were conducted each week, ease of implementation, and student enjoyment. However, implementation results were not reported.

Mahar et al. (2006) implemented a classroom-based PA program (i.e. Energizers) in elementary school students (N = 62; Mage = 9.1 ± 0.9) in 3rd and 4th grade in eastern

North Carolina to evaluate the effects of the 12-week program on children's PA levels (classroom-based on total school day) and on-task behavior during academic instruction. SES of the school or the participants was not reported. Energizers were described as short classroom-based physical activities lasting approximately 10 minutes and integrated into grade-appropriate learning materials with no equipment and little teacher preparation. Before the intervention was delivered, classroom teachers attended a 45-minute training session where researchers taught teachers how to lead students through Energizer activities. At the end of the session, teachers were provided with an Energizer booklet containing classroom-based physical activities. On-task behavior was defined as verbal or motor behavior that followed class rules and was appropriate for the learning situation and measured through direct observation using interval recording. Off-task behavior was any behavior that was no on task and was coded as either motor off-task, noise off-task, or passive/other off-task. These off task behaviors were combined to create one measure of off-task behavior. Researcher calculated an on-task score for each student by summing the number of intervals in which each behavior occurred during the total observation period and dividing by the total number of intervals. Student PA was measured using pedometers. Implementation fidelity of Energizers was conducted through direct observations by a primary and secondary observer on observation days. However, implementation fidelity data were not reported. Results indicated that students who received the Energizer program took, on average, approximately 782 more steps a day in school than control classes. Also, average time on task increased approximately 8% from pre-energizer to post-energizer in the intervention group and decreased approximately 3% in the control group.

Recommendations and Research Related to Teacher Professional Trainings

Teacher professional development through trainings or workshops has become a popular method for integrating new programming into schools. The idea that inservice and preservice teacher trainings are a crucial component to program implementation dates back to the 1960s (Sassi, Monroy, & Testa, 2004). Durlak and Dupree (2008) suggest that trainings are a key variable to the success of program implementation (e.g., professional development is a form of technical assistance that aids teachers in their implementation of programming). Recently, there has been much debate as to the "best practices" of professional development regarding design and learning experiences offered during professional development activities (Guskey, 2009). Although this debate is healthy and beneficial for the future of professional development efforts, these discussions have not led to a current set of guidelines or "best practices" for effective professional development. Guskey (2009) advocates for professional development providers to critically assess and evaluate their training efforts to identify effective professional development practices.

The evaluation of a training can aid the training's designers to better understand the format and delivery of the training, as well as the effects the training had on its intended outcomes (Guskey, 2002). However, despite its importance, there is evidence that evaluations of training programs are often inconsistent or missing, possibly due to insufficient time allocation, lack of expertise, or lack of methods and tools (Eseryel, 2002). Guskey (2002) identifies two challenges to evaluating professional development, including (a) the quality of staff development and (b) the complexity of the evaluation

process. The quality of staff development refers to the extent to which trainings are linked to daily classroom practices and the effect on student learning (Guskey, 2002). Desimone (2011) identified five core features to professional development: (a) content focus, b) active learning, (c) coherence, (d) duration, and (e) collective participation. Content focus specifies that professional development opportunities should focus on subject matter and how students learn that content. Active learning supports teachers' opportunities to get involved such as observing and receiving feedback, analyzing student work, or making presentation, instead of simply sitting through lectures. Coherence focuses on what teachers learning in professional development and its consistencies with other professional development, their knowledge and beliefs, and with school reforms and policies at the state and district level. Duration recommendations suggest professional development opportunities should be spread over a semester and should include 20 hours or more of contact time. Collective participation of professional development entails groups of teachers from the same grade, subject, or school should participant in professional development opportunities together to build an interactive community. It is crucial for professional development research to identify if professional development opportunities provided to teachers align with current recommendations of effective professional development.

Gaps in the Related Research

Lack of Observational Research on MI. Little is known about the extent or nature of MI in schools (Webster et al., 2015), as the majority of MI research is limited to self-report data (Bartholomew & Jowers, 2011; Cothran, Kulinna, & Garn, 2010; Cradock et al., 2014; Elmakis, 2010; Evenson, Ballard, Lee, & Ammerman, 2009; Gibson et al.,

2008; Holt et al., 2013; Howie et al., 2014; Skrade & Vazou, 2013; Webster et al., 2013) Problems with self-report measures have been well documented. For example, Sallis and Saelens (2000) highlight the limitations to PA self-report measures, including problems with reliability, content validity, and relative criterion validity. The lack of observational research on MI has not only left unanswered questions about the extent and nature of MI but has also resulted in uncertainty about why MI interventions have either succeeded or failed in meeting their goals (Webster, et al., 2015). Observation of MI practices is critical to process evaluations of program implementations to assess variables such as implementation fidelity and dose, which are related to program outcomes. Systematic observations of MI can help to cultivate the descriptive research base needed to better understand the prevalence and varied applications of MI in schools. This information is necessary to advance both intervention programming and teacher education related to MI as key strategies to increase teachers' use of MI (Webster, et al., 2015), particularly in settings where MI usage may be relatively low and children are in the most need of PA promotion (Turner & Chalupka, 2016).

Russ et al. (2017) developed a reliable and valid systematic observation instrument designed to assess the nature and extent of MI used in elementary school classrooms. The System for Observing Student Movement in Academic Routines and Transitions (SOSMART) conceptualizes MI into two types: deliberate and incidental. Deliberate MI is defined as PA opportunities directed by the teacher, while incidental MI is defined as PA opportunities not directed by the teacher. SOSMART classifies MI into seven different types of movement: reward/incentive, opening activity, teacher-directed

transition, nonacademic movement, academic-infused movement, resulting environment and non-teacher directed transition.

A reward/incentive movement type is provided by the teacher as an obvious (explicitly stated) reward for providing a correct response and behavior in class. For example, the teacher may state that as a reward for students being on-task during a math lesson they are now able to participate in a movement activity. An opening activity is a movement directed by the teacher within in the first 10 minutes of the official start of the school day (e.g., a school-wide morning exercise on the school's news show). Teacher-directed transitions occur when the teacher gives a direction for students to be active resulting in students moving from point A to point B (e.g., desks to carpets) or between finishing one task and getting ready for the next task (e.g., putting away supplies and/or transitioning from one subject to another subject). Teacher-directed transitions can also include the teacher directing students from point A to point B for housekeeping tasks and procedures (e.g., picking up/putting away supplies, using restroom, Russ et al., 2017).

Nonacademic movement is movement directed by a teacher within a lesson or between lessons (e.g., activity break) that does not include academic content. An example of this would be if a teacher instructed students to run in place once finished answering a question while waiting on other students to answer the question. Academic-infused movements are directed by the teacher within a lesson or between lessons with the goal of reviewing or teaching academic content (e.g., when the teacher instructs students to move around the room like their favorite animal to teach students the different ways in which animals move). Movement resulting from the environment can be divided into two parts: physical environment and non-teacher directed transition. Physical environment

movement is when equipment is used to facilitate movement regardless of the intensity of the movement (e.g., pedal desks, stability balls). Non-teacher directed transitions occur when the teacher did not give a direction for student(s) to be active, but the student(s) still engaged in PA (e.g., a student gets up to go throw away a piece of paper or to retrieve more supplies; Russ et al., 2017).

SOSMART includes 11 MI variables divided into three categories of teacher variables and two categories of student variables. Teacher categories include teacher involvement, instruction, and movement type and student categories identify the number of students active and the reason for being active. SOSMART utilizes a 20-second continuous interval recording format in which the observer (coder) makes decisions regarding teacher involvement and student responses in stages. The first stage requires the observer to answer the question: Did the teacher give a direction to be active? If the answer is "Yes", the coder proceeds to code the teacher directive variables (e.g., teacher directed or other), instruction variables (e.g., teacher-led or technology-led), and movement variables (e.g., type of movement) and then proceeds to the Stage Two (student response variables). On the other hand, if the answer in Stage One is "No", the coder moves directly to Stage Two (Russ et al., 2016).

Measurement Limitations in MI Interventions to Improve On-Task Behavior

Studies using direct observation measures of on-task behavior have shown that MI has a positive effect on children's on-task behavior (Goh, Hannon, Webster, Podlog, & Newton, 2016; Grieco, Jowers, & Bartholomew, 2011; Mahar et al., 2006). Despite the positive results of these previous studies, additional research investigating the potential benefits of MI programs/approaches is needed due in part to on-task conceptualization

limitations. A crucial step to collecting credible data is to accurately define a behavior so it can be reliably measured (Houten and Hall, 2001; Mahar, 2011). Conceptualizations of on- and off-task behavior in previous studies were largely researcher-driven and based on assumptions that student behavior was either consistent or inconsistent with the teacher's classroom management expectations and procedures. Mahar (2011) highlights the need for researchers to define on-task behavior in a manner that leaves little room for subjective interpretation by data collectors. He identifies a good definition for on-task behavior as one that is written clearly, specifies the boundary of the behavior, and refers to observable characteristics of the behavior. Research that employs systematic observation of on-/off-task behavior and defines and measures such behavior using more externally valid (e.g., teacher-driven) approaches is needed to strengthen evidence supporting the academic benefits of MI (Russ et al., 2017).

One way to possibly improve the real world authenticity of on-/off-task behavior measurement is to incorporate the teacher's use of redirects as a proxy measure. As a strategy of effective classroom management, teachers have the ability intervene by identifying inappropriate behavior and implementing a variety of techniques to encourage appropriate behavior and minimize disruptive behaviors in the classroom (Conroy, Sutherland, Snyder, & Marsh, 2008). Conroy et al. (2008) identify a variety of classroom interventions designed to support positive behavior in students, such as using close supervision and monitoring, establishing classroom rules, increasing opportunities to respond to academic requests, increasing contingent praise, and providing feedback and error correction. These classroom teaching strategies have been shown to be effective in supporting teacher desired behaviors and minimizing problem behaviors (Farmer et al.,

2006). Farmer et al., (2006) identifies proximity management, both group and individual redirection, and communicating with students as effective strategies for classroom management in the general classroom setting. Proximity measurement is described as moving near a student or students who are not engaging in desired behavior or meeting expectations (Farmer, 2006). Group redirection occurs when the teacher restates the expectations to the class (i.e. "As a reminder, keep your eyes on your own paper"). During group redirects, teachers may also attempt to reinforce desired behaviors by praising students that are meeting expectations. Sometimes, individual redirection is beneficial (i.e. eye contact, whispering a gentle reminder to a student) because it allows the teacher to redirect the student behavior in a less confrontational manner, which may facilitate a more positive response from students with consistent behavioral problems (Farmer, 2006).

Overall, teacher redirects can be conceptualized as teacher verbal and nonverbal behaviors enacted with the goal of changing student behavior from off-task to on-task. Teacher redirects can come in the form of, but are not limited to, nonverbal gestures (e.g., pointing or purposively starring a student), verbal redirects (e.g., calling student's name, reminding a student of the assigned task and/or behavioral expectations), and proximity (e.g., the teacher positions her/himself closely to a student that is off-task to encourage the student to change behavior). Examining the relationship between teacher redirects and students' off-task behavior has the potential to demonstrate the viability of redirects as a suitable, teacher-driven proxy measure for off-task behavior. However, there is no research to date that has attempted to quantify or measure teacher redirects of student behavior.

Another limitation of previous on-task behavior research has been the use of focal child protocols, which direct the observer's focus to one child at a time. The use of a scan protocol designed to capture the full classroom context would enable research in this area to provide a more complete picture of the occurrences of student off-task behavior. Furthermore, no studies have investigated the association of student off-task behavior with school-based PA opportunities beyond those provided within the traditional general education classroom, and there is a lack of PA and off-task behavior research that has focused on low SES settings, which have unique challenges regarding classroom management and student behavior..

Absence of MI Training Evaluations

Several MI interventions in the United States have reported providing professional development trainings to teachers regarding MI (Adams-Blair et al., 2011; Donnelly et al., 2009; Erwin et al., 2011). However, limited information was provided so the content and organization of these trainings are largely unknown. More descriptive information is needed regarding MI trainings to be able to evaluate the quality of these trainings and determine which aspects of the trainings may be most beneficial. Identification of effective training processes focusing on MI is crucial to informing the design of future trainings and to improving both preservice and inservice teachers' effective use of MI strategies. Due to a lack of descriptive information regarding the content and organization of the MI trainings, there is a need to determine whether such trainings are consistent with best practice recommendations for teacher professional development. This dissertation will apply Baldwin and Ford's (1988) framework for the training to transfer process to evaluate an MI training with respect to participants'

reactions, learning, behavior, and results. Rigorous evaluations of MI trainings will help in the identification of strengths and limitations in current professional development practices, increase the ability of interventionists and teacher educators to provide optimal trainings for classroom teachers, and increase the sustainability of training outcomes (Webster et al., 2015).

Chapter 3: Study 1

Systematically Observed Movement Integration in a Low Socioeconomic School District

[1]Stewart, G., Webster, C.A., Weaver, R.G., Stodden, D.F., Brian, A., & Egan, C.A. (In preparation). Systematically observed Movement Integration in a Low Socioeconomic School District. *Preventive Medicine.*

Introduction

Schools are targeted as a natural setting to promote PA in children due to the high level of access schools have to children, and the pre-existing infrastructure for PA promotion (e.g., professionals trained to work with youth, space for engaging in PA) (Pate et al., 2006; Institute of Medicine [IOM], 2013). Current recommendations for school-based PA promotion focus on whole-of-school approaches, which involve leveraging a school's PA promotion capacity through multiple school contexts and resources (IOM, 2013). A leading model of a whole-of-school approach to PA promotion is a comprehensive school PA program (CSPAP) (Centers for Disease Control and Prevention [CDC], 2015; National Association for Sport and Physical Education [NASPE], 2008a). This model consists of five components: (a) physical education, (b) PA during school, (c) PA before and after school, (d) staff involvement, and (e) family and community engagement (CDC, 2013).

A CSPAP is intended to target two overarching goals: (a) to provide a variety of school-based physical activities to enable all students to participate in the nationally recommended 60 minutes of mostly moderate-to-vigorous PA each day and (b) to provide coordination among the CSPAP components to maximize understanding, application, and practice of the knowledge and skills learned in school physical education (CDC, 2013; NASPE, 2008a). With respect to the first goal, the IOM (2013) recommends that children accumulate half of their 60 minutes of PA during regular school hours. Physical education and recess are well established examples of school programming designed to support children's PA participation. However, trends in U.S. educational policy at state and district levels have led to reduced allocated time for physical education

and recess (Lee, Burgeson, Fulton, & Spain, 2007), underscoring the need to provide children with additional opportunities to participate in PA during school.

Classroom Movement Integration

An approach to adding PA opportunities during school hours is integrating movement into general education classrooms where teachers instruct children in academic subjects such as Math, English Language Arts, Science and Social studies (Russ et al., 2017). Classroom movement integration (MI) is the process of infusing PA, at any level of intensity, into regularly scheduled classroom time (Webster, Russ, Vazou, Goh, & Erwin, 2015). MI is associated with increases in children's PA (Benden et al., 2014; Erwin, Abel, Beighle, & Beets, 2011; Goffreda et al., 2010; Mahar et al., 2006; Robinson, Wadsworth, Webster, & Bassett, 2014; Stewart, Dennison, Kohl, & Doyle, 2004) and numerous other physical, cognitive, and social-emotional benefits for children (Webster et al., 2015). Numerous MI strategies have been identified (Russ, et al., 2017). For example, teachers might increase children's PA during transitions (e.g., walk like a robot to line up) provide movement breaks between academic lessons (e.g., brain breaks), embed PA into instruction and learning experiences (e.g., use jumping jacks to count during addition), use PA equipment classrooms (e.g., cycle desks, treadmills), or arrange materials and physical space to stimulate PA (e.g., place materials for different subjects on different sides of the classroom, organize desks in groups to increase floor space for larger movements).

Notwithstanding initial efforts to catalogue occurrences of MI in previous research, the descriptive knowledge base on MI remains underdeveloped. Most accounts

of MI are based on teacher self-reports (Bartholomew & Jowers, 2011; Cothran, Kulinna, & Garn, 2010; Cradock et al., 2014; Elmakis, 2010; Evenson, Ballard, Lee, & Ammerman, 2009; Gibson et al., 2008; Holt et al., 2013; Howie et al., 2014; Skrade & Vazou, 2013; Webster et al., 2013). Little objective data have been reported to document the extent and nature of MI in schools, particularly in non-intervention contexts (Webster et al., 2015). Thus, the purpose of the present study, was to examine, via systematic observation, the extent and nature of MI in elementary classrooms. This study was conducted within a low socioeconomic status (SES) school district, based on the pronounced need to address health disparities with children in low income communities (Thornton et al., 2016) and recent survey research indicating that lower SES schools use less MI than higher SES schools (Turner & Chalupka, 2016). An increased understanding of the prevalence and varied application of MI in low SES schools will enable interventionists and teacher educators to tailor programming and professional development to contexts where there may be an increased need for support.

Methods

Participants and Setting

All 1st and 4th grade classroom teachers (N = 48) in eight elementary schools in a rural, low SES school district from a southeastern part of the United States participated in the study. Teachers of 1st and 4th grade were selected because of limited study resources and to capture a representative sample of teachers from both the younger (K-2) and older (3-5) elementary grades. Approximately half (*n* = 21) of the teachers completed and returned demographic information (Table 1). Of these teachers who provided completed

demographic information, 48.3% self-identified their race/ethnicity as African American, 45.0% self-identified as White (Caucasian), and 13.3% self-identified as Other. All teachers were female (N = 21). Teachers' mean age was 39.9 years (SD = 12.29) and mean teaching experience was 11.6 years (SD = 9.59) ranging from 2-34 years of experience. Almost all of teachers (96.7%, *n* = 20) reported having between 20-30 students in their classroom and not having a teaching assistant. Only 28% (*n* = 6) of participating teachers reported having any previous MI training.

The schools were selected because of their low SES, close proximity to the researcher's university, their joint organizational structure within the school district, comparable demographics, existing relationships with the university, and willingness to participate in the study. At the time of the study, the participating schools served 3,752 students. Students in the district were predominantly African American (86%) from low-income families (91% of the students received free or reduced lunch).

Instrumentation

This study utilized the System for Observing Student Motivation in Academic Routines and Transitions (SOSMART) (Russ et al., 2017). SOSMART is a systematic observation instrument designed to capture the frequency and nature of MI in elementary school classrooms. It is a two-stage system which uses a 20-second continuous interval recording format that includes eleven variables categorized into two types: (a) teacher involvement and (b) student response. Teacher involvement variables include "teacher directives" (who gave the directive to be active), "instruction" (who/what led the activity), and "movement types" (how movement was integrated into classroom time,

based on observed teacher directives). Student response variables include "students active" (what portion of the class is active and how much of the students' bodies are active) and "as a result of" (teacher directives, the physical environment, or non-teacher directed transitions). Observers must pass through two decision stages. In the first stage, the observer makes a decision about the involvement of the classroom teacher (or other classroom leader). The second stage requires the observer to make a decision about the response of the students in the class (Figure 1).

Procedures

The researchers' university Institutional Review Board (IRB) and the participating school district approved this study. Participating teachers and the students' parents completed informed consent forms prior to data collection. Participants (teachers and students) retained the right to refuse or stop participation in the study at any time.

Ten observers were trained on how to conduct observations in an elementary classroom setting in an unobtrusive manner. In a two-hour training, observers became familiar with the tool, discussed relevant topics and questions regarding the use of the tool, and practiced observing and coding videos of elementary school classrooms. Initially, observers watched pre-record videos of classrooms similar to where observations would take place and completed individual scans using SOSMART. After every scan, each individual code was discussed and any questions regarding coding were answered by the training leaders. Once observers were comfortable with individual scans, observers completed multiple 5-minute periods of reliability scanning and coding to calibrate their use of the tool. Inter-rater and intra-rater reliability scores were calculated

using interval-by-interval percent agreement. Before participating in data collection, all observers achieved above 80% inter-and intra- rater reliability (van der Mars, 1989).

Researchers observed each participating classroom randomly selected unannounced school days between October 1st, 2015 and May 30th, 2016. Upon arrival at the school, observers checked in at the front desk and proceeded to teachers' classrooms. Observers were instructed to identify the least obtrusive location in the classroom and to begin their observations immediately. The eight-hour school day was divided into four 2-hour observation shifts. Between shifts, observers conducted reliability scans to ensure inter- and intra-reliability was maintained throughout the entire data collection process.

Data Analysis

Descriptive statistics were calculated, using Microsoft Excel, to determine the frequency and types of MI across classrooms for each school.

Results

There were a total of 79 SOSMART observation days and 9398 individual observation scans across the 48 classrooms (Figure 1). SOSMART results are presented in Table 2. Most (n = 44) teachers were observed using MI and students participated in movement 41.3% of the observed time. On average, teachers were observed giving a directive for students to be active approximately 14.4% (SD =0.21) of observation periods, and 94.6% (*SD* = 0.32) of directives for students to be active were given by the classroom teacher. Directives were given verbally 91.0% of observations and via technology (which is still considered a teacher directive to be active) 8.7% (*SD* = 0.17) of observations.

Teacher directed transitions accounted for 61.6% of the movement types, while about one third (35.7%) of the movement types were "other movement" (directed movement opportunities between or during lessons). Other movement was academically-infused 5.6% (*SD* =0.17) of the total observation with language arts (*M* =55.5%) and math (*M*=27.3%) amounting to over 80% of the academic content in which movement was infused. When teachers gave a directive for students to transition (e.g., line up at the door), students were always observed walking and teachers never modified the movement type. Teachers were seldom observed using other MI movement types, including using MI as a reward (*M* = 1.5%) and as an opening activity (*M* = 1.3%). When the teacher did not explicitly give a directive for students to be active students were active 26.9% (SD =0.22) of the time, almost always as a result of a non-teacher directed transition (*M* = 99.5%) (e.g., getting up to sharpen a pencil, retrieving needed supplies). During non-teacher directed transitions, students' movement was observed as off-task 7% of the time. For the most part, observed movement occurred in small groups of students (*M* = 92.9%).

Discussion

The purpose of this study was to understand the extent and nature of MI in a low-SES school district using systematic observation. Classroom teachers directed movement in the classroom approximately 15% of the time during regular classroom instruction, routines, and transitions. Teacher-directed MI usually involved giving verbal directions for students to transition (e.g., "All students line up at the door", "Go grab your materials and return back to your seat"). However, student movement most often was observed as a result of non-teacher directed MI, which occurred almost twice as frequently as teacher directed MI. Nearly all instances of non-teacher directed MI were a function of non-

teacher directed transitions. It was clear that teachers' established classroom management systems permitted students to independently move around the classroom on an as needed. It seemed these movement opportunities enabled students to take responsibility for themselves and exercise autonomy as learners. Overall, transitions (both directed and non-directed) made a particularly important contribution to student movement in this study.

While current recommendations for MI (CDC, 2013) focus on teacher-directed movement breaks and active lessons as classroom-based strategies to promote PA, there was little evidence of these strategies being used in the present study. Moreover, teachers integrated movement as an opening activity or as a reward less than 2% of the time movement occurred in the classroom. These MI strategies may not be best suited for low SES classrooms. However, it is notable that more than two thirds of the teachers in this study reported having no previous training in MI. In a recent systematic review using a social-ecological perspective, Author (in review) identified one of the key factors associated with MI implementation as professional development. In order to increase the prevalence of MI in classrooms, efforts need to be made to train preservice and inservice classroom teachers to use MI strategies.

Professional development trainings should expose teachers to a wide range of MI options to increase MI uptake/adoption. A primary focus of trainings should be on strategies that capitalize on already existing MI within the classroom/school contexts being targeted. Since MI occurred mainly through transitions in the present study, helping teachers learn to modify transitions with the aim of increasing children's PA participation is recommended. The results showed that the teachers directed students to walk during

transitions but never made modifications that would promote more MVPA in line with the national guidelines for children's daily PA. Modified transitions might involve, for example, incorporating different locomotor skills (e.g., hop, jump, skip, gallop) or fitness challenges (e.g., perform lunges while transitioning, walk on toes, raise knees to chest) during regular transition time. For teachers who work in particularly challenging educational settings, a priority focus for MI trainings should be adopting strategies that easily fit within the regular practices and activities used on a day-to-day basis. Given that teachers often perceive they have a lack of time to promote PA in their classrooms due to pressures such as academic testing, teaching to the curriculum, and extracurricular responsibilities (Webster et al., 2015), helping teachers learn to promote PA by taking advantage of existing time is vital to the adoption and sustainability of MI. Integrating movement as part of the "natural order" of classroom life may help teachers learn to adopt MI without feeling that doing so requires extra time.

Aside from gearing professional development toward MI strategies that fit best within teachers' existing classroom routines, another approach that could potentially increase the amount of MI occurring in low SES school districts is university service learning (Webster, Beets, Weaver, Vazou, & Russ, 2015). Bringle and Clayton (2012) define service learning as "the integration of academic material, relevant community-based service activities, and critical reflection in a reciprocal partnership that engages students, faculty/staff, and community members to achieve academic, civic, and personal learning objectives as well as to achieve public purposes" (p. 105). In short, this is a partnership between a school and a local university in which university students deliver MI in teachers' classrooms. Recently, service learning has become a popular approach in

the health promotion field (Carson & Raguse, 2014; Galvan & Parker, 2011) and is viewed as having great potential for youth PA promotion (Rosencranz, 2012). Serivce learning could support teachers in low SES schools by providing trained teacher candidates as MI leaders. Furthermore, classroom teachers may adopt ideas and strategies they see teacher candidates implement (Webster et al., 2017). SL has the potential to provide opportunities for inservice classroom teacher ownership and buy-in of MI, provide preserve teachers access to authentic learning environments to build their confidence and competence for using MI, and provide mutual benefits use for both inservice and presevice teachers through reciprocal learning (Michael et al., 2018).

A notable strength of this study is the large sample size and number of observations conducted. Additionally, to the authors' knowledge this is the first descriptive MI study that used systematic observation to measure MI in low SES schools. This study provides reliable, valid, and objective data on MI (Russ et al., 2017) in a critical context for future interventions. As with all observational research, a limitation of this study is the potential for a Hawthorne effect (Franke & Kaul, 1978) to have occurred. In an effort to overcome this limitation, observations of teachers were conducted on unannounced and randomly selected school days at various times throughout the day.

In conclusion, the results of this study suggest that classroom teachers in low SES schools may not be maximizing PA opportunities for students during the school day through teacher-directed MI strategies. However, the overall amount of MI observed, buttressed by the relatively strong prevalence of non-teacher directed transitions, challenges the notion that schools "are primarily and deliberately designed to produce cognitive outcomes, and their structures and programs inadvertently suppress children's

physical activity" (McKenzie & Kahn, 2008, p. 172). The academic classroom may offer children numerous PA opportunities that have not been given sufficient consideration in previous conceptions of a typical school day. Further systematic observation of teachers' use of MI, as well as continued investigation into the contribution of MI to children's PA and school performance is needed to build a robust descriptive research base for future experimental research, intervention design, and teacher professional development.

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Table 3.1. Teacher Demographics Results

	1st Grade (N=15)	4th Grade (N=6)	Total (21)
Race/Ethnicity			
African American	46.7%	50.0%	48.3%
White(Caucasian)	40.0%	50.0%	45.0%
Other	13.3%	0.0%	6.7%
Gender			
Female	100%	100%	100.0%
Male	0.0%	0.0%	0.0%
Age (In Years)	41.6 (SD=13.6)	38.0 (SD =10.9)	39.8 (SD =13.0)
Teaching Experience (In Years)	11.4 (SD= 9.9)	11.75 (SD= 10.9)	11.6 (SD=9.9)
Number of Students			
<20	6.7%	0.0%	3.3%
20-30	93.3%	100.0%	96.7%
Previous MI Training			
Yes	40.0%	16.7%	28.3%
No	60.0%	83.3%	71.7%
Teaching Assistant			
Yes	6.7%	0.0%	3.3%
No	93.3%	100.0%	96.7%
Highest Degree Achieved			
Bachelors	6.7%	33.3%	20.0%
Specialists	6.7%	0.0%	3.3%
Masters	86.7%	66.7%	76.7%

Table 3.2. SOSMART* Results

	Operational Definition	Schools								
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**Total**
Teacher Involvement: Were students instructed to be active?										
Yes	Teacher gave an explicit direction for students to be active.	12.3%	16.6%	16.9%	16.1%	9.3%	16.7%	10.4%	16.5%	14.4%
No	There was no teacher direction for student to be active	87.7%	83.4%	83.1%	83.9%	90.7%	83.3%	89.6%	83.5%	85.6%
Teacher Involvement: Who gave the instruction?										
Classroom Teacher Directed	Classroom teacher gave direction for students to be active.	100%	94.4%	90.4%	93.8%	98.8%	94.7%	84.3%	100%	94.6%
Other-led	Other teacher gave direction for students to be active.	0.0%	5.6%	9.6%	6.2%	1.2%	5.3%	15.7%	0.0%	5.4%
Teacher Led: How was the Instruction Given?										
Verbal		74.3%	88.8%	86.5%	92.3%	91.7%	99.6%	92.9%	99.6%	90.7%
Technology		25.7%	11.2%	12.9%	7.2%	4.8%	0.4%	7.1%	0.0%	7.5%
Demonstration		0.0%	0.0%	0.6%	0.5%	3.6%	0.0%	0.0%	0.4%	0.4%
Movement Type: Type of Movement										
Reward	Movement was provided by the teachers as an obvious reward for providing a correct answer or behavior in class.	1.4%	0.0%	7.9%	3.1%	0.0%	0.0%	0.0%	0.0%	1.5%
Opening Activity	Movement was directed by the teacher within the first 10 minutes of the official start to the school day.	2.1%	0.0%	1.7%	0.0%	0.0%	0.0%	6.3%	0.0%	1.3%
Teacher Directed Transition	The teacher gave a direction for the students to be active resulting in students moving from Point A to Point B.	57.6%	52.0%	62.9%	58.2%	51.2%	67.0%	56.7%	86.7%	61.6%
Other Movement	Movement directed by the teacher within a lesson or between lessons	38.9%	48.0%	27.5%	38.7%	48.8%	33.0%	37.0%	13.3%	35.6%

	followed by a class response resulting in student movement.									
Non-Academic	Movement direct by the teacher within or between lessons that DOES NOT include academic content (e.g. movement breaks)	42.9%	55.0%	34.7%	20.0%	17.7%	64.5%	51.1%	100.0%	48.2%
Academic Infused	Movement directed by the teacher within a lesson or between lessons that **DOES** review/teach academic content	57.1%	45.0%	65.3%	80.0%	82.9%	35.5%	48.9%	0.0%	51.8%
Language Arts		75.0%	88.9%	0.0%	51.6%	76.9%	69.7%	26.1%	N/A	55.5%
Math		0.0%	11.1%	78.1%	48.4%	23.1%	30.3%	0.0%	N/A	27.3%
Science		25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	73.9%	N/A	14.1%
Social Studies		0.0%	0.0%	18.8%	0.0%	0.0%	0.0%	0.0%	N/A	2.7%
Other		0.0%	0.0%	3.1%	0.0%	0.0%	0.0%	0.0%	N/A	0.4%
Teacher Directed: If transition, Did the Teacher Modify the Movement?										
Yes		0%	0%	0%	0%	0%	0%	0%	0%	0%
No		100%	100%	100%	100%	100%	100%	100%	100%	100%
Student Response: Students Active										
Whole Class	All students are active.	2.5%	8.8%	7.8%	2.3%	1.7%	2.3%	0.2%	0.0%	3.2%
Part Class	More than 50% but not all students are active.	5.9%	7.6%	4.6%	3.8%	2.2%	4.9%	1.7%	0.4%	3.9%
Small Group	Fewer than 50% of students are active.	91.6%	83.6%	87.6%	93.9%	96.1%	92.8%	98.0%	996.%	92.9%
As a result of:										
Physical Environment	Equipment used to facilitated movement, resulting in student activity, regardless of level of intensity.	0.1%	0.8%	0.0%	2.3%	1.3%	0.3%	0.4%	0.5%	0.7%

Non-Teacher Directed Transition	The teacher did not give a direction for student(s) to be active, but the student(s) still engaged in physical activity. resulting in student(s) moving from Point A to Point B.	31.0%	21.5%	19.9%	17.5%	39.4%	26.9%	33.7%	19.6%	26.2%

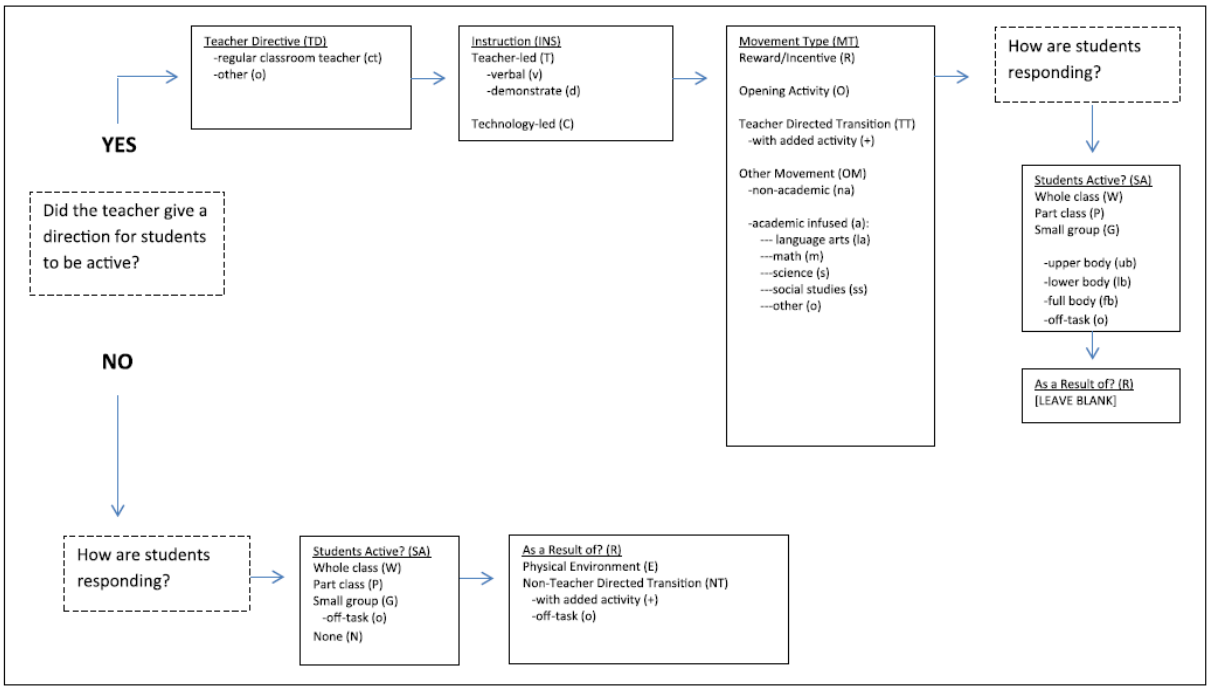

Figure 3.1. Russ et al., (2017), Health Education & Behavior, p. 308

CHAPTER 4: STUDY 2

The Association of Children's Participation in School Physical Activity Opportunities with Classroom Conduct

[1]Stewart, G., Webster, C.A., Weaver, R.G., Stodden, D.F., Brian, A., & Egan, C.A. (In preparation). The association of children's participation in school physical activity opportunities with classroom conduct . *Journal of School Health.*

Introduction

Student behavior in the classroom has been a measurable proxy for student learning since the 1970s such behavior can be measured directly, immediately, and continuously through observation (Fisher, 1981). As a result, student on-task behavior, also referred to as academic engagement, is considered an enabler of academic success (Greenwood, Horton, & Utley, 2002). Minimizing disruptions in the classroom and disciplinary actions are key factors associated with student achievement because it allows academic learning time to be maximized. Teachers especially value on-task behavior as an outcome of their work because they understand how essential it is to their students' academic performance (Mahar et al., 2011). Clear evidence of improvement in student learning outcomes plays a key role in changing teachers' attitudes and beliefs about educational strategies (Buehl &Beck, 2015). Therefore, it is vital for research to link new educational strategies that decrease student off-task behavior in the classroom to increase teacher use and buy-in of these strategies.

Children's participation in physical activity (PA) has been found to be a catalyst for increasing student on-task behavior in the classroom (Bailey & DiPerna, 2015; Goh et al., 2016; Grieco et al., 2016; Howie, Beets, & Pate, 2014; Mahar et al., 2006; Mullender-Wijnsma et al., 2015; Riley et al., 2015). Specifically, these previous studies showed that engagement in increased levels of PA during classroom time increased children's time on task. However, a possible limitation of this previous research is that conceptualizations of on-/off-task behavior were largely researcher-driven and based on assumptions that student behavior was either consistent or inconsistent with the teacher's classroom management expectations and procedures. On-task behavior was defined as student

behavior that is attentive to the teacher and/or actively engaged in the appropriate task. Mahar (2011) highlights the need for researchers to define on-/off-task behavior in a manner that leaves little room for subjective interpretation by data collectors.

One way to possibly to reduce observer subjectivity related to on-/off-task behavior measurement while also increasing the real world authenticity of such measurement is to incorporate the teacher's use of redirects of off-task behavior as a proxy measure. Teacher redirects can be defined in terms of teacher verbal and nonverbal behaviors enacted with the goal of changing student behavior from off task to on task. Rather than attempting to judge whether a student is on- or off-task, researchers could instead focus their attention on the teacher's use of redirects to indicate whether there is an occurrence of off-task behavior. This would reduce the need for observers to interpret children's behavior, while also aligning observational protocols with teachers' conceptions of appropriate student conduct. Ultimately, teacher-driven measures of students' classroom performance may prove to be particularly useful in future professional development initiatives and interventions aimed at enhancing teachers' use of practices (e.g., PA promotion) that benefit student outcomes.

Another potential limitation of previous research on children's on-/off-task behavior (Goh et al., 2016; Grieco et al., 2016; Howie et al., 2014; Mullender-Wijnsma et al., 2015; Riley et al., 2016) is the use of focal child protocols to observe and measure classroom behavior. Focal child protocols concentrate observations on individual children for a specified period of time and then rotate observations to another child. While a number of systematic observation tools in PA research use focal child protocols (Brown et al., 2006; McKenzie et al., 1992; McIver, Brown, Pfeiffer, Dowda, & Pate, 2009;

Ridgers, Sratton, & McKenzie, 2010), using such protocols could lead to an underestimation or overestimation of the observed target behavior due to where the observers' attention is focused (Weaver, in press). An alternative technique for capturing observational data is the use of scan protocols. This technique involves scanning the classroom in its entirety, which more closely simulates how classroom teachers observe for student off-task behavior (Ayers & Gray, 2000). Scan protocols are used in several observation systems used in PA research (McKenzie et al., 2000, Weaver, Beets, Webster, & Huberty, 2013; Weaver et al., 2016) and have the potential to provide a more complete picture of student off-task behavior by capturing class-level, as opposed to individual-level, data at every recording interval.

Previous studies of PA and on-/off-task behavior are further limited by their singular focus on the general education classroom setting (Goh et al., 2016; Grieco et al., 2016; Howie et al., 2014; Mahar et al., 2006; Mullender-Wijnsma et al., 2015; Riley et al., 2015). Current recommendations for promoting children's PA focus on multi-component, school wide programming, in which PA opportunities span multiple contexts during the school day, including general education classrooms, physical education, and recess (Center for Disease Control, 2013; Institute of Medicine, 2013). Additionally, some schools now offer movement facilitative classrooms (e.g., kinesthetic classrooms, activity labs) designed specifically to integrate PA opportunities into regular classroom time. These new classrooms transform the traditional, movement restrictive classroom environment into a movement facilitative space using non-traditional classroom equipment such as pedal desks and stability balls, as well as room organization strategies (e.g., placing materials strategically around room to promote student PA). To date, no

research has investigated the association of student off-task behavior in the classroom with participation in activity opportunities during school programming across multiple contexts where children's PA promotion is recommended.

To address these limitations of previous research, this study had two aims. The first aim was to evaluate teacher redirects and the use of a scan protocol as viable substitutes for current methods of measuring student off-task behavior. The second aim was to examine the association of teacher redirects with opportunities for children to participate in PA across the school day. PA opportunities investigated included (a) time spent in movement breaks within general education classrooms, (b) time spent in movement facilitative classrooms, (c) time spent in physical education class, and (d) time spent at recess.

Methods

Design

This study was a natural experiment that observed participating children in a low socioeconomic (SES) elementary school during regular school hours. Children's participation in each of the four school-based PA opportunities served as the independent variable in this study while student off-task behavior/teacher redirects in traditional classrooms served as the dependent variables.

Participants and Setting

Classroom teachers (N=6) at a Title 1 school in the southeastern U.S. were randomly selected to participate in this study. The school district spent approximately $50,000 to purchase equipment for movement facilitative classrooms (i.e., one kinesthetic

classroom and two activity labs) at the beginning of the school year. The entire school participated in a professional development training at the beginning of the year to increase teacher buy-in and use of the non-traditional classrooms. Each participating classroom in this study consisted of 19 children on average (SD = 2.32) and one classroom teacher with no assistant.

PA within traditional classrooms involved infusing PA into regularly scheduled classroom time, referred to Webster et al. (2015) as "movement integration". Movement integration that occurred during the study involved teacher-led movement breaks (e.g., "Shake Out the Wiggles", Go Noodle videos). Regular classrooms were similar in size and design with traditional desks and access to a smart board. Movement facilitative classrooms were similar in size to the traditional classrooms except they were equipped with PA promotional equipment including pedal desks and balance equipment. Time spent in the movement facilitative classrooms usually involved children working in pairs on a select piece of equipment. Pairs of children would then rotate through each piece of equipment.

Children attended 40 minutes of physical education once per week. Lessons typically involved fitness activities (i.e., "Running for Health", "Dance for Fitness") or skill-development games (i.e., "Target Throwing", "Dribbling Across River"). Recess periods were provided one time per day, usually on the playground. The school had one playground that consisted of a concrete slab with four basketball goals and a jungle gym area that was directly outside the cafeteria. During recess, children participated in a range of supervised but unstructured activities such as free-play, basketball, and tag.

Instrumentation

Children's participation in each PA opportunity. Direct observation was used to record when children participated in each of the four PA opportunities investigated in this study (i.e., time in movement breaks within general classrooms, time in movement facilitative classrooms, time in physical education, and time at recess,). Data collectors observed children from participating classrooms throughout the whole school day for two full weeks over the course of one academic year (see Procedures for further detail about the observation protocol).

Children's PA. Wrist-worn ActiGraph GT9X accelerometers using 5-second epochs assessed children's engagement in light (Matthews et. al., 2008) and moderate-to-vigorous PA (Evenson, Catellier, Gill, Ondrak, & Mcmurray, 2008). Activity data were used to verify children's participation in PA within each of the PA contexts investigated in this study.

Student off-task behavior and teacher redirects. An instrument was developed for this study to measure students' off-task behavior and teacher redirects. The researchers followed steps recommended by Mahar et al. (2011) to maximize the credibility of the data collected. Step 1 involved accurately defining the behavior in question so that it could be measured reliably (Van Houten & Hall, 2001). Research supervisors, the project manager, and members of the data collection team met prior to data collection to discuss and agree on how to operationally define off-task behavior and teacher redirects. The researchers pilot tested the definitions and observation protocol in a

local summer program held at a site with similar environmental characteristics as the participating school.

Step 2 entailed training observers (McKenzie, 2010). Observers were trained initially during a two-hour classroom session in which they were familiarized with study protocols, operational definitions, and tool use. Observers also practiced coding videotapes of elementary school classrooms that were not part of this study. Using tablets, observers would code for a five-minute period and compare codes. If disagreement occurred between observers, a discussion would take place until the observers reached consensus about coding. Observers also attended four additional one-hour refresher trainings throughout the school year to maintain their observational skills and prevent observer drift during data collection (Mahar et al., 2011).

The purpose of Step 3 was to determine the type and length of recording to be used. Based on Mahar et al.'s (2011) recommendations, a 10-second scan utilizing event recording was utilized to capture off-task behaviors. In Step 4, inter-observer reliability was established to ensure observation credibility (Mahar et al., 2011). Inter-rater reliability was set at 80%, which is deemed to be a sufficient level of agreement (van der Mars, 1989). Finally, Step 5 involved establishing inter-observer agreement during study observations to protect from observer drift (Mahar et al., 2011). Observers completed two reliability scans at each shift change to ensure adequate inter-rater reliability throughout the observation periods.

Overall, the observation system was a 40-second (10 scan, 10 record, 10 scan, 10 record) event recording system that identified if students in the observed classroom were

participating in off-task behavior and the occurrences of teacher redirects. In the final instrument, off-task behavior was defined as instances when students were (a) not paying attention to the task assigned by the teacher, (b) participating in off-task movement (e.g., leaving desk without permission, unwanted physical contact between students), or (c) participating in off-task talking (i.e., talking about something not pertaining to the assigned task). The observation system employed for this study was an event recording system with a 10-second scan interval followed by a 10-second record interval. Observers would scan the classroom from left to right identifying if any students were participating in off-task behaviors. The observer would record if any students were off-task and then begin the teacher redirect portion of the observation interval.

A teacher redirect was operationally defined as any teacher behavior, verbal or non-verbal, which attempts to change student behavior from off-task to on-task. Teacher redirects could come in the form of, but were not limited to (a) nonverbal gestures (e.g., pointing, staring), (b) verbal prompts (e.g., calling a student's name, reminding the student what on-task behavior is, using comparative remarks such as "I like the way Dan is sitting quietly as his desk"), and (c) proximity control (i.e., teacher positions her/himself close to a student that is off task). Observers would scan the classroom from left to right identifying the occurrence of a teacher redirect. Observers would record the occurrence of teacher redirects similar 10/10 scan record interval as off-task behavior.

Procedures

Initially, the researchers obtained approval to conduct the study from the university's Institutional Review Board, the school district, and the school principal.

Participation in this study was voluntary and both student and teacher participants had the right to refuse participation. Parents were provided with the opportunity to opt out of participation and child assent was obtained. Trained observers recorded when children participated in each school-based PA opportunity, the number of children on/off task in traditional classrooms, and occurrences of teacher redirects for four non-consecutive weeks (e.g. September, November, February, April) during the 2016-2017 school year. Each school day (i.e., 7:30-2:30) was divided into four observational shifts: Shift 1 was from 7:00 a.m.-9:10 a.m.; Shift 2 was from 9:00-11:10 a.m.; Shift 3 was from 11:00 a.m.-1:10 p.m.; and Shift 4 was from 1:00-3:00 p.m. Shifts 1 and 4 allowed for 30 minutes of travel to/from the school.

Data Analysis

Descriptive statistics were calculated including the mean time children spent in each PA opportunity and the mean time children engaged in PA while participating in each PA opportunity. Percent agreement between observers was calculated for researcher-observed occurrences of off-task behavior and teacher redirects. A multi-level mixed logistic regression explored the likelihood of a teacher redirect at 5, 10, 15, 30, and 60 minutes (Goh et al., 2016) following the different types of PA opportunities. The post-hoc lincom command in STATA was used to follow up on statistically significant relationships and test for differences in teacher redirects for each time period following PA opportunities provided to students.

Results

PA Opportunities Provided

A total of 13,682 scans were conducted. The average time children spent in each PA opportunity was 32.7 minutes for movement breaks in the classroom, 37.2 minutes for movement facilitative classrooms, 42.4 minutes for physical education, and 20.2 minutes for recess (see Table 1). Table 1 also displays the average amount of PA (minutes and intensity levels) children accrued while participating in each PA opportunity. Time spent in physical education provided students with the most total activity time on average (M = 15.9), closely followed by MI in traditional classrooms (M = 15.3), then time spent in movement facilitative classrooms (M = 12.7) and time spent at recess (M = 9.2 minutes).

Consistency of Student Off-Task and Teacher Redirect Measures

Acceptable inter-rater reliability was found for occurrences of teacher redirects (M = 80.07%) and occurrences of student off-task behavior (M = 84.29%) using our scan protocol. In 84.47% of the scans that an off-task behavior was coded a teacher redirect was coded as well. Thus, because of the considerable overlap between observations of off-task behavior and teacher redirects the relationship between activity opportunities and teacher redirects was explored exclusively.

Association of Teacher Redirects with PA Opportunities

On average, teachers redirected student behavior 15.4% of the total scans. The likelihood of a teacher redirect following children's participation in each PA opportunity

is presented in Figure 1. A teacher redirect was less likely to occur after movement breaks in traditional classrooms at all of the time points: 5-minute time point (OR=0.11, 95% CI: 0.02, 0.83), 10-minute time point (OR = 0.12, 95% CI: 0.03, 0.49), 20-minute time point (OR = 0.07, 95% CI: 0.02, 0.28), 30-minute time point (OR = 0.18, 95% CI: 0.09, 0.39), and 60-minute time point (OR = 0.22, 95% CI: 0.09, 0.37). Contrary to expectations, a teacher redirect was not less likely to occur at any time point after children spent time in physical education or at recess and the only time that a teacher redirect was statistically significantly less likely to occur after children spent time in movement facilitative classrooms was at 30 minutes (OR=0.69, 95% CI: 0.50, 0.94).

Discussion

This study addressed several limitations of previous research on school-based PA promotion and children's on-/off-task behavior. Specifically, we used teacher redirects as a proxy for student off-task behavior and a scan protocol to obtain class-level as opposed to individual-level data, as well as examined the association of children's participation in multiple PA opportunities during the school day with teacher redirects.

Teacher Redirects

The finding that teacher redirects occurred in 84.47% of the scans that a student was observed off-task indicates that teacher redirects are an acceptable proxy measure for off-task behavior. Focusing on teacher redirects may reduce observer subjectivity by filtering conceptualizations of off-task behavior through each teacher's own classroom management expectations and practices. Whereas previous research primarily defined on-/off-task behavior using researcher-developed notions of the construct (Goh et al., 2016;

Grieco et al., 2016; Howie et al., 2014; Mahar et al., 2006; Mullender-Wijnsma et al., 2015; Riley et al., 2015), the present study demonstrates that teacher redirects provide a viable measurement alternative, which yields to teachers' professional and contextually-grounded perspectives of acceptable and unacceptable classroom conduct. Future studies might further test the merits of using teacher redirects in lieu of other off-task behavior measures used in previous research.

Scans Observational Protocol

This study also demonstrated the viability of using a scan protocol instead of a focal child protocol to conduct observations of student off-task behavior and teacher redirects. The advantage of using scans to collect observational data is that each scan captures class-level data as opposed to individual student data, thus assembling a more complete and externally valid portrayal of the full context being investigated. In future investigations of PA and on-/off-task behavior, adding classroom context variables (e.g., lesson focus, motivational climate) to scans of student and teacher behavior would allow for the development of a more holistic and richer descriptive research base to underpin theory building using correlational and experimental designs.

Children's Participation in PA Opportunities and Off-Task Behavior

Consistent with previous studies using direct observation to investigate the relationship between PA and on-/off-task behavior (Goh et al., 2016; Grieco et al., 2009; Grieco et al., 2016; Mahar et al., 2006), this study suggests that movement breaks in general education classrooms support desired academic behaviors of children. Further, these benefits appear to last for at least 60 minutes following the movement break. This

was the first known study to also examine children's classroom behavior (i.e., via teacher redirects) in relation to other PA opportunities beyond the traditional classroom setting during the school day. Overall, however, other PA opportunities investigated were found to have little relevance to teacher redirects in traditional classrooms. This could be because these opportunities occurred outside of traditional classrooms in separate locations within the school's campus, and therefore were followed by hallway transitions back to the traditional classrooms. Hallway transitions, which are often related to increased student behavioral problems (Barbetta, Norona, & Bicard, 2005), could mitigate or even reverse the effects of PA participation with regards to reducing student off-task behavior in the classroom. Alternatively, given that expectations for student behavior may differ depending on the PA opportunity (e.g., rules at recess may be less stringent than rules in the classroom), children may have returned to their traditional classrooms in need of increased redirection.

Study Strengths and Limitations

This study had several strengths. The use of teacher redirects as a proxy for student off-task behavior introduces a teacher-driven approach to measurement in this line of research. In addition, students were observed at multiple points across an entire academic calendar year. Other strengths of this study include the use of accelerometer data as a manipulation check for PA opportunities and measuring teacher redirects at five different intervals following each PA opportunity. This study also has limitations. Analyses did not focus on specific PA experiences (e.g., learning tasks in physical education, gameplay at recess) or PA engagement (e.g., minutes of moderate activity) as an independent variable. It is possible that the lack of association between PA

opportunities and teacher redirects was due, at least in part, to varying types of activities not assessed in this study or lag time between these activities and measurement of teacher redirects.

Conclusion

The results of this study indicate that teacher redirects can be used as a proxy for off-task behavior. Further, this work adds to mounting research evidence supporting the benefits of classroom-based PA for reducing children's off-task behaviors during classroom time. Further research to determine the mechanisms responsible for the differing relationships between school day PA opportunities and children's off-task behaviors is needed. This work has the potential to inform MI interventions and educational policy seeking to increase student on-task behavior in the classroom.

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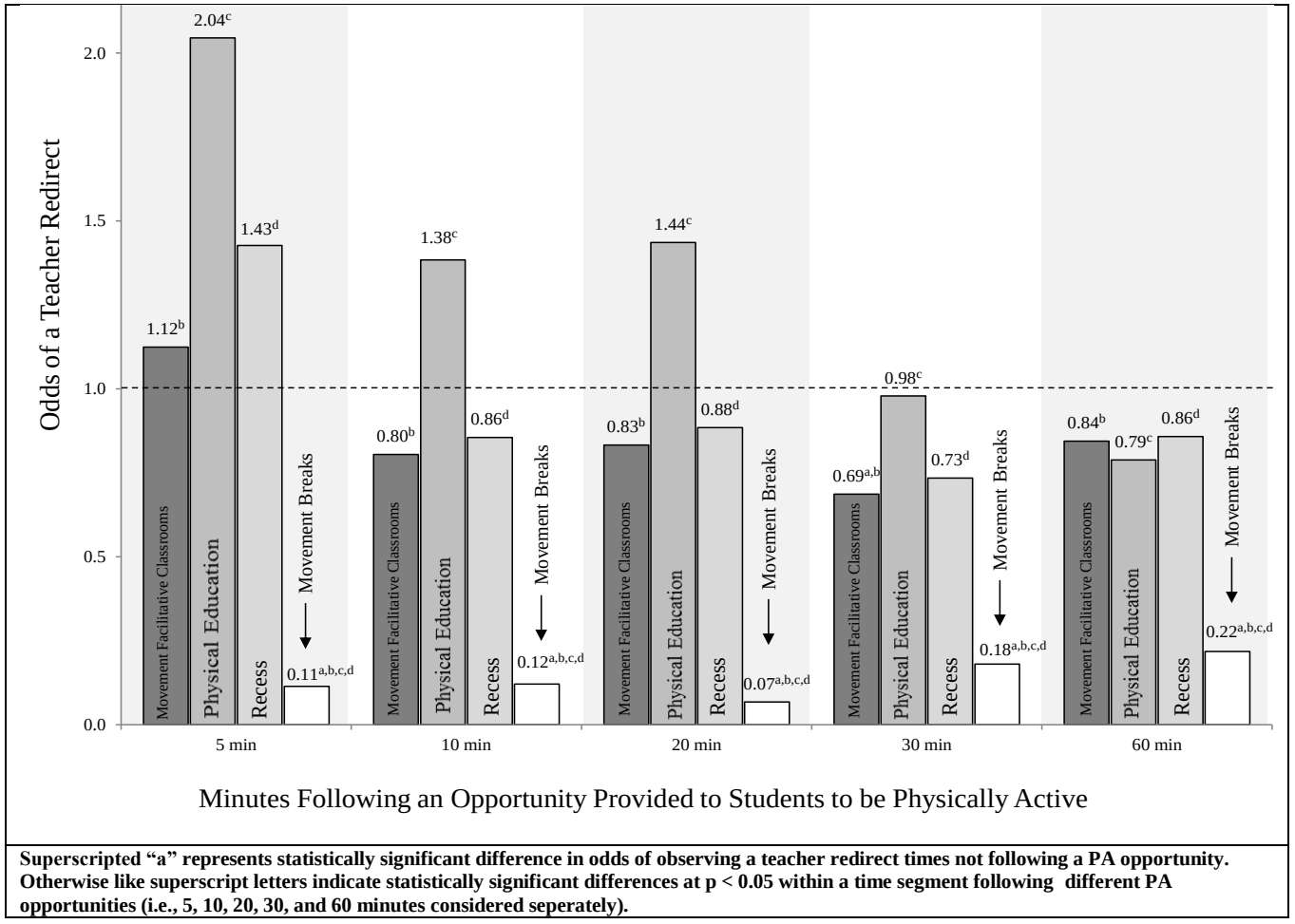
Table 4.1. Mean time children spent in each PA opportunity

	Time Spent in Movement Breaks in Traditional Classrooms	Time Spent in Movement Facilitative Classrooms	Time Spent in Physical Education	Time Spent at Recess
Mean Light PA (min)	12.5	8.5	9.8	4.8
Mean MVPA (min)	2.7	4.1	6.1	4.4
Mean Total Activity Time (min)	15.3	12.7	15.9	9.2
Mean Total Time in PA Opportunity (min)	32.7	37.2	42.4	20.2



Superscripted "a" represents statistically significant difference in odds of observing a teacher redirect times not following a PA opportunity. Otherwise like superscript letters indicate statistically significant differences at $p < 0.05$ within a time segment following different PA opportunities (i.e., 5, 10, 20, 30, and 60 minutes considered seperately).

Figure 4.1. Odds of a teacher redirecting following a PA opportunity

Chapter 5: Study 3

Evaluation of a Movement Integration Training Delivered in a Low Socioeconomic School District

[1]Stewart, G., Webster, C.A., Weaver, R.G., Stodden, D.F., Brian, A., Egan, C.A., Michael, D., Sacko, R., & Patey, M. (In preparation). Evaluation of a Movement Integration Training Delivered in a Low Socioeconomic School District. *Journal of Teacher Education*.

Introduction

Physical activity (PA) opportunities within general education classrooms are widely recommended as part of school wide programming aimed at increasing children's daily participation in PA (Center for Disease Control and Prevention [CDC], 2013; Hill, Dengel, and Lubans, 2015; Institute of Medicine 2013; Pangrazi, Beighle, Vehighe, & Vack, 2003;). Classroom-based PA promotion, referred to as movement integration (MI), is defined as infusing PA into regularly scheduled classroom time at any level of intensity (Webster, Russ, Vazou, Goh, & Erwin, 2015). MI can take various forms, such as providing children with movement breaks after time spent sitting, teaching academic lessons via physically active learning experiences, or embedding extra PA into routine transitions between lessons (Russ et al., 2017). Comprehensive and systematic reviews of MI leave little doubt that it can increase children's PA as well as contribute in other ways to children's physical, cognitive, and social-emotional development/health (Erwin, Beighle, Carson, & Castelli, 2013; Naylor et al., 2015; Owen et al., 2016; Watson, 2017; Webster et al., 2015).

Due to the well-documented benefits of MI, and in tandem with recent declines in allocated time for physical education in schools (Lee, Burgeson, Fulton, & Spain, 2007), national recommendations from the Centers for Disease Control (CDC, 2015) and the Society of Health and Physical Educators (SHAPE) America (2015) identify the involvement of classroom teachers in children's PA promotion as integral to the success of school-based programs designed to ensure all children achieve the nationally recommended 60 minutes per day of PA (U.S. Department of Health and Human Services [USDHHS], 2018). Classroom teachers have expressed a willingness to

incorporate MI into the school day (Parks, Solmon, &Lee, 2007) but also perceive barriers to using MI, such as lack of resources, unsupportive school administrators, and limited professional development trainings (Michael et al., 2018; Stylianou, Kulinna, & Naiman, 2016; Usher & Anderton, 2014). Professional trainings for MI should be viewed as fundamental to helping classroom teachers overcome challenges related to MI. Training and technical assistance are crucial components to the success of efforts within organizations (e.g., schools) to implement new programs and practices (Durlak & Dupree, 2008; Sassi, Monroy, & Testa, 2004). Providing classroom teachers with sufficient professional development for MI may increase their perceived competence and self-efficacy for using MI and reduce the number of barriers these teachers perceive with respect to promoting PA in their classrooms (Webster, 2011; Webster, Buchan, et al., 2015; Webster, Erwin, & Parks, 2013; Webster, Monsma, & Erwin, 2010).

Despite the importance of training to new program adoption and sustainability, evaluations of training programs are often inconsistent or missing, possibly due to insufficient time allocation, lack of expertise, or lack of methods and tools (Eseryel, 2002). A recent review found that trainings were a common approach used in interventions to increase teachers' use of MI but studies seldom reported much detail about the design, implementation, or quality of the trainings employed (Author, in review). The evaluation of training can aid the training designers to better understand the format and delivery of the training, as well as the effects the training had on its intended outcomes (Guskey, 2002). In order to ensure MI professional development initiatives embedded within intervention research and continuing teacher education are optimally effective, research focusing on the alignment of current trainings with recommended best

practices for teacher professional development is needed. Additionally, understanding how school professionals perceive their experiences with MI trainings in which they participate can enhance efforts to design trainings that best meet the preferences and needs of end users. The purpose of this study, therefore, was to evaluate a MI training, taking into consideration the training's fidelity to recommended best practices for professional development and school professionals' perspectives as participants in the training.

Methods

Study Design

A concurrent, triangulation mixed-methods design was used, which entails collecting both quantitative and qualitative data with the goal of cross-validating or corroborating findings within a single study (Creswell & Clark, 2017). Qualitative and quantitative research designs provide unique lens for answering a particular research question and both families of design have their distinct strengths and limitations (Creswell & Clark, 2017). Research that employs mixed methods allows for a deeper, richer interpretation of findings through the integration of quantitative and qualitative methods (Creswell & Clark, 2017).

Participants and Setting

Participants (N=7) in this study were five classroom teachers, two activity lab supervisors, and the principal at a Title 1, low socioeconomic (SES) elementary school in a southeastern city in the U.S. All participants were African American females who were 34 to 64 years old (M = 50.88; SD = 9.57). Teachers had an average of 21.88 (SD = 7.77)

years of teaching experience. While the teachers reported having no previous training related to MI, both lab supervisors and the principal reported having participated in previous MI trainings. The MI training took place at the school, which served 502 students. A total of 98% of the students were African American and 88.9% of the students received free or reduced lunch. The average teacher-to-student ratio at the school was 13:1.

Instrumentation

Rating scale. Quantitative data for this study were collected using a rating scale (Figure 1), which the researchers developed to assess the alignment of the training with recommended best practices for professional development. Desimone (2011) identifies five recommendations for effective professional development: a) content focus, b) active learning, c) coherence, d) duration, and e) collective participation. The content focus component suggests professional development should focus on subject matter content and how trainees learn that content. The active learning component advocates for teachers to have opportunities to be actively involved, such as observing, receiving feedback, analyzing student work, or making presentations, as opposed to sitting through lectures. The coherence component recommends that what teachers learn in any professional development activity should be consistent with other professional development, with their knowledge and beliefs, and with school, district, and state reforms and policies. The duration component advises that professional development activities should be spread over a semester and should include 20 hours or more contact time. The collective participation component suggests groups of teachers from the same grade, subject, or

school should participate in professional development activities together to build an interactive learning community.

Interviews. Qualitative data for this study were obtained via formal, semi-structured interviews aimed at determining participants' perspectives of the training (Glense, 2016; Patton, 2015; Yin, 2014). Interviews also were used to provide context for the fidelity scores from the rating scale. Interview questions (Figure 1) focused on the purpose of the training, strengths and weaknesses of the training, barriers and facilitators to lab implementation following the training, and the effectiveness of the training.

Field notes/informal conversations. Field notes were taken by the lead researcher and data collectors (N=8) during observations of teachers' participation in kinesthetic classroom/activity lab use and other MI strategies as a part of a larger study. Informal conversations occurred between the lead researcher and all participants before and after the training, as well as during the MI implementation period before/after school, and during lunch and hallway interactions. These conversations generally focused on perceived barriers and facilitators of kinesthetic classroom/activity lab use and relevant ideas/suggestions based on informal teacher observations (Glense, 2016; Patton, 2015; Yin, 2014). When relevant, field notes and informal conversations were documented and discussed among the researchers to add context to a particular phenomenon, category, and/or theme. These two data sources were ultimately used to corroborate and provide further support for participant interview responses.

Procedures

In the Spring of 2016, the school district received a $50,000 grant to incorporate a kinesthetic classroom and two activity labs into the school. The kinesthetic classroom was fitted with ergonomic furniture (e.g., pedal desks, striders) designed similar to desks in a traditional classroom setting but with modifications to facilitate movement. The activity lab was equipped with balance beams and walking mats instead of traditional desks.

Prior to the start of the academic year, a mandatory training related to the new classrooms was provided to all teachers in the school. In collaboration with the school district, the researchers agreed to evaluate the training (the focus of the present study), as well as teachers' use of the classrooms and associated outcomes including children's PA and on-task behavior (Author, in preparation). The first author's university ethics review board and the participating school district approved the study and all participants provided informed consent prior to data collection.

The researchers obtained a video recording of the training in its entirety. The first, eighth, and ninth author discussed the Desimone (2011) components to increase the reliability of rating each component. Subsequently, these authors watched the video and each of them individually created an outline of events that occurred during the training. They then discussed their individual outlines and created a combined outline to identify the content and types of learning experiences/events that occurred during the training. Next, each author used the previously described rating scale to rate the training.

After the researchers completed their ratings of the training, the first author conducted the interviews. Four separate interviews were conducted, including one focus group interview with the teachers and three separate individual interviews with the principal, and two lab supervisors. The teacher interview was held in the school library on a half-day. The other interviews took place in participants' respective offices at times that were convenient to them. Interviews lasted from 15 to 33 minutes (M=24 minutes). All interviews utilized the same questions and prompts to identify differences and commonalties in responses.

Data Analysis

Quantitative analysis. Through discussion between the first, eighth, and ninth author, an overall fidelity score was created for each Desimone (2011) recommendation based on observer agreement and individual fidelity scores of the training to best practices. For each component, researchers identified if a Desimone (2011) component was observed being met (Yes/No). Any disagreements regarding the training's alignment with each professional development component were resolved via discussion among authors until a consensus was reached. An overall fidelity score was calculated for the MI training by averaging the fidelity of each particular component to identify the training's total fidelity with Desimone's (2011) recommendations.

Qualitative analysis. Interviews were transcribed verbatim. The lead author and sixth, seventh, and ninth authors conducted *in vivo* coding where codes were separated into categories and analyzed for theme generation (Glense, 2016; Patton, 2015; Yin, 2014). To ensure the credibility of the analysis, data triangulation using multiple data

sources (i.e., video of the training, rating scale scores, formal interviews, field notes, and informal conversations) and member checking was performed (Creswell & Clark 2017; Patton, 2015). Participants were assigned pseudonyms to protect their privacy.

Results

Fidelity of Training to Recommended Best Practices

The training delivered earned a fidelity score of 50% on content focus, 25% on active learning, 100% on coherence, 0% on duration, and 33% on collective participation. Overall, the training achieved a total fidelity score of 42% with regards to best practices for professional development training recommended by Desimone (2011). Table 1 provides additional details related to the fidelity of the training.

Participant Perspectives of the Training

Participant perspectives of the training were categorized into three themes: (a) training purpose, (b) challenges, and (c) future training recommendations. Each theme had one or more subthemes.

Training Purpose

The first theme is the training purpose (i.e., what participants perceived the purpose of the training to be). Within this theme there were two subthemes: (a) program awareness and (b) how PA benefits the brain. Initially, informal conversations with participants the week following the training conveyed the idea that a major purpose of the MI training was to make school faculty aware of the new kinesthetic classroom and activity labs that were being introduced to the school that year and to increase teacher motivation and buy-in related to using the classrooms/labs. These types of responses

persisted during formal interviews with participants. Andrew, one of the lab supervisors, described the purpose of the training as "to introduce the labs that we are going to initiate at our school" (Interview data). Hamilton, the school principal, identified the purpose of the training as "they [lab supervisors] really wanted staff to understand what they were doing and bring everybody on board." One of the teachers (Stephen) described the training purpose as "more or less show and tell." (Interview data)

Along with program awareness, stakeholders perceived another purpose of the training was to highlight the ways that PA participation benefits the brain. During the teacher focus group interview, all teachers verbally agreed with Hadley's statement, "How [student participation in PA] was going to be beneficial [in terms of] kinesthetic and brain research." When asked about the purpose of the training during his interview, Stewart responded, "So he explained the left side and the right side of the brain, how you had to have both of them working together and overlap each other to do what you're doing" (interview data). This aligns with Hamilton's perceptions of the purpose of the training: "It was really good stuff…we did a lot of movement, talking about the left side of the brain and the right side of the brain and the impact it would have on math, the impact it would have on reading" (interview data). Teachers were observed discussing with their students how learning while moving in the kinesthetic classroom and labs improve how students' brains learn and function on multiple occasions (field notes). Throughout the time in which the kinesthetic classroom and labs were implemented, school faculty sought further information about the research presented and asked how they could identify other quality resources focusing on participation in movement and its benefits for the brain (informal conversations and field notes).

Aside from the commonalities in participants' perceptions about the purpose of the training, there were also some differences. The classroom teachers perceived the training was designed to prepare teachers to incorporate movement using the recently acquired kinesthetic classroom and activity lab equipment while the principal and both lab supervisors felt the overall focus of the training was on integrating movement in the traditional classroom setting. All teachers verbally agreed with Hadley's perception that "the main focus of the training was so school faculty could actually look and become familiar with the equipment the children were going to be using" (interview data). This perception does not align with that of the principal and lab supervisors. For instance, Hamilton perceived the training's focus to be on "how we engage students in learning in a nontraditional way [and] also to engage faculty and staff in their kinesthetic movement so they can utilize it in their own classrooms at different times" (interview data). Stewart perceived the purpose of the training to be "just to see the different activities that you could do with the children whether you have the equipment or not" (interview data). This aligned with Andrew's response that "I think the training basically was for the teachers to use in the classroom that didn't have the equipment" (interview data).

Challenges

Participants reported challenges associated with some of the content provided during the training. Two subthemes subsumed this theme: (a) implementation and (b) scheduling and communication. Responses from teachers and lab supervisors indicated that certain issues arose during implementation that would have been beneficial for the training to address. Participants felt that they had to learn about strategies for efficient and effective program implementation through their own implementation experiences.

Kaitlyn's (one of the teachers) response – "I think I must have been the guinea pig because I went [to the lab] the first day and [the lab supervisor] realized there were too many students and then we split the class the next go around" (interview data) – demonstrates this trial and error mentality. Similarly, Stephen said, "The first time my kids went to the lab there was confusion because they didn't know how to use some of the equipment and I didn't either" (interview data). Andrew affirmed there were implementation challenges for the lab supervisors, too: "[Scheduling multiple labs] got to be a bit much because the labs are not close together so I was running from one end of the school back and forth and I said wait a minute this isn't going to work" (Interview data).

All participants perceived scheduling and communication of lab use/protocol as barriers to implementation that should have been covered during the training. Initially, teachers conveyed their frustrations with using the lab to the lab supervisors and the lead researcher during informal conversations. During lab use, there were constant issues observed by data collectors such as classes showing up to use the lab when the lab was already being used by other classes or teachers unable to use the labs because the lab was locked and not accessible (field notes). In reference to these issues, Leah Grace (teacher) stated, "So it seems like it all goes back to communication" (interview data). Scheduling and communication challenges were also implied by Stewart, who came up with his own solution to addressing these challenges: "I pull small groups so…I don't have to worry about scheduling and don't have to worry about everybody in the school getting in there" (interview data). Andrew's response aligns with other participants' perceptions about challenges:

> I think the teachers' perceptions were that they would be able to go in to the lab and use it whenever they wanted to…and what our principal wanted was something different. So I think [the teachers'] perception was, "oh, okay, I can do this whenever I come to the lab" but it wasn't scheduled that way. (Interview data)

Future Training Recommendations

Participants perceived that future trainings could be improved by maintaining certain aspects of the existing training as well as increasing the training's effectiveness through (a) effective modeling and demonstrations, (b) context-specific trainings, (c) continuous training, and (d) additional resources. All participants agreed during interviews and informal conversations they found the presenters' enthusiasm and energy to be motivational. The principal also conveyed the desire to add professional development opportunities focusing on MI delivered by the presenter into the school's Title 1 plan (interview data). All participants also agreed during interviews on the importance of keeping the focus on brain research.

Teachers believed the training could be improved by allowing them the opportunity to observe effective MI modeling and demonstrations during the training. "I'm always one for a model…so I would have liked to have seen someone actually show me how this could work… I think it would have been good to have or to see model lessons with actual kids," stated Leah Grace (interview data). Multiple teachers approached the lead researchers about delivering a lesson in their own classrooms with their children to serve as models for their own efforts in the weeks following the training (informal conversations). Field notes by data collectors indicated that teachers were

consistently verbally expressing a lack of confidence in their ability to use equipment appropriately or effectively in a lesson while attempting to use the lab.

Future recommendations also focused on the need for context-specific trainings. Kaitlyn said, "The first thing I really think is [the training] should have been broken into the upper and the lower grades for the different labs because [these grade levels are] completely different" (interview data). Lab supervisor Andrew conveyed the same message in his statement, "it's different…what would work with a 5th grade class may not work for a 1st grade class because the kids are different and the needs are different" (interview data). In weekly informal conversations between the lead researcher and both lab supervisors individually, a common barrier discussed entailed how ideas and lessons that were successful with one grade level/class were unsuccessful with another grade level/class. It became evident that training with an included focus on age-, grade-, and subject-specific professional development and support would provide teachers with more useful, relevant MI training.

The desire for continuous and more in-depth training is embodied in Andrew's response:

> I think if we can just do like a full day maybe of the training… and we've said this to our district to stop giving us quickies [trainings] and expecting a miracle. We need to be effective in what we are doing…It takes time… it does not happen overnight. (Interview data)

Hamilton reiterated this perspective: "I think one of the things we should have done and did not do, looking back in hindsight, is that we needed Dave to come back more than

once" (interview data). Field notes from data collectors during MI implementation supported the idea that teachers consistently made comments such as "I can't wait until the next training" and "I believe with more practice I could do this."

The need for additional resources was clear across all participants, who indicated their desire to be provided with resources they could refer back to following the training. "As teachers, we like to take stuff that we can immediately do in class, so if I just had a plethora of stuff that we can just pick, pick, pick, pick, it would be easier" said Stewart (interview data). Hamilton also expressed a need for additional resources to be provided, but felt an instructional video would be more beneficial or better utilized by teachers than a manual. Throughout implementation of the labs, teachers were constantly asking for resources in the form of lesson plans that they could reference during their planning (informal conversations and field notes).

Discussion

The purpose of this study was to identify the level of fidelity between a MI training delivered in a low SES school and recommended best practices for teacher professional development, as well as identify school professionals' perceptions of the training. Evaluations of trainings are vital to increase the effectiveness and efficiency of the training process (Guskey, 2002). Effective and efficient uses of training resources (e.g., time, money) in low SES schools are crucial to maximizing teachers' competence and confidence in using MI. The success of trainings and the extent to which trainings are linked to daily classroom practices and student learning are important variables that may impact MI implementation (Guskey, 2002; Webster et al., 2015).

There was overlap between best practice recommendations for professional development and teachers' perceptions of the training. First, teachers conveyed a need to gain more experience during the training and potentially lead actual students during the training to make the experience as authentic as possible. This was expressed in the theme of future recommendations and the subtheme of effective modeling and demonstrations. According to Desimone (2011), trainings should provide teachers with the active learning opportunities that include observing, analyzing student work, making presentations, and receiving feedback. Results from a national survey of teachers indicated that "hands-on", active learning experiences provided to teachers during trainings are more likely to produce increases in trainee knowledge and skills (Garet, Porter, Desimone, Birman, & Yoon, 2001). However, the MI training evaluated in the present study limited the majority of teacher participation to the role of observer/student participant with few opportunities for teachers to practice leading MI activities. Providing teachers with the opportunity to try new ideas and reflect on the results of their efforts is viewed as a characteristic of effective professional development (Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009).

Another area of convergence between recommended best practices and participant perspectives of the training is the focus on sufficient time allocation for professional development. Desimone (2011) suggests trainings should spread over a semester and include at least 20 hours of contact time. The MI training delivered in this study lasted approximately 2 hours. This limited amount of contact time does not align with current training recommendations or teacher perceptions of the training time necessary to enhance their use of MI. Minimal, one-shot trainings for teachers do not allow teachers

enough time for "serious, cumulative study of the given subject matter" (Darling-Hammond et al., 2009).

Although there were many consistencies across participant perspectives of the training, there was an obvious disconnect regarding the overall focus of the training (promote awareness/teacher buy-in, provide MI strategies for traditional classrooms or provide training specific to the kinesthetic classroom and activity labs). These different perceptions of the training's purpose seemed to influence participants' expectations for the training and evaluation of training outcomes. Future MI trainings need to ensure that training design includes identified strategies for clearly communicating the purpose of the training and aligning training activities with the stated purpose. This will allow for training content to provide information that is relevant to how the MI is intended to be implemented.

It is unclear why the MI training lacked adherence to certain components of Desimone's (2011) recommendations for professional development. One possible explanation was a potential lack of funding and/or resources to deliver continuous training. During interviews, all stakeholders agreed that more training contact hours were needed for them to feel confident and competent in MI. Discussion with the principal (Hamilton) implied that funding was limited and additional training would be funded potentially through the school's Title 1 plan. In addition to funding continued training for MI, one potential strategy for increasing the effectiveness and sustainability of training efforts and maximizing resources of the school community is a community-based participatory research (CBPR) approach to MI training design and program implementation (Israel, Schulz, Parker, Becker, & Allen, 2003; Webster, Beets, Weaver,

Vazou, & Russ, 2015). A CBPR approach to MI would engage researchers and school professionals in collaboratively identifying the school's needs and identifying suitable MI implementation strategies that combine evidence-based practice with rich contextual knowledge of local stakeholders. In the future, combining the expertise of MI researchers, professional development trainers, teachers, and school administrators could lead to MI trainings that are more relevant, useful, and effective for end users.

As with all research, this study has both strengths and limitations. The mixed methods design allowed for trainings to be evaluated through quantitative and qualitative lenses to more thoroughly understand commonalities and differences regarding best practice recommendations for professional development trainings and teachers' perceptions of the strengths and weaknesses of the MI training. However, due to the availability of participants for participation in the interviews, the interviews were conducted several months after the completion of the training. This lag in time may have led to participants forgetting some of the details of the training. Conducting an interview immediately following the training and prior to implementation, as well as interviewing participants after several months of implementation, could help to flesh out more insights specific to the training's perceived purpose and effectiveness related to MI practices.

Conclusion

In future MI trainings, those who design, develop and deliver the trainings need to ensure that these experiences optimally support school professionals. If MI trainings are going to be considered a valuable asset in increasing teachers' value and use of MI, these trainings need to be designed around best practice recommendations and teachers' perceived needs. Conducting a needs assessment of the school environment is an

important preliminary step in enhancing training design and refinement (Reitsma & Mentz, 2013; Nkopodi 2006). Future research should attempt to understand if a CBPR approach to MI training design could benefit training relevance and effectiveness. Additionally, future studies might focus on the relationship between alignment of trainings to best practice recommendations and teachers' implementation of desired programs/practices.

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Table 5.1. Fidelity to Recommended Practice Results

Component	Component Characteristics	Yes or No	Component Fidelity Score
Content Focus	Focus on Subject Matter Content	Yes	50%
	Focus on How Student Learn That Content	No	
Active Learning	Observing	Yes	50%
	Receiving Feedback	No	
	Analyzing student work	Yes	
	Making Presentations	No	
Coherence	Consistent with other professional development	Yes	66%
	Consistent with teachers knowledge and beliefs	No	
	Consistent with school, district, and state reform policies	Yes	
Duration	Professional Development activities should spread over a semester	No	0%
	Should include 20 hours or more of contact time	No	
Collective Participation	Groups of teachers from the same grade	No	33%
	Groups of teachers from the same subject	No	
	Groups of teachers from the same school	Yes	
	Total Fidelity Score:		42%

Purpose (for the researchers only)

This interview will focus on the teachers' experiences participating in the kinesthetic and activity lab training. Questions will primarily focus on determining the participating teachers' perceived strengths, and/or weaknesses of the training. This interview will also explore teacher perceptions/suggestions as to how the training could be improved. This interview is designed to last approximately 30 minutes. Please state your name before responding to questions. With your permission, I will record this interview for transcription purposes. Do I have everyone's permission to record this interview? I will now turn on the audio recorders.

Introduction (to be read to the participants)

The purpose of the interview is to discuss your perceptions and experiences with respect to the kinesthetic and activity lab training at the beginning of this year. You are encouraged to answer openly and honestly. During this interview, I will ask questions and open the floor for responses. I will also introduce probes to investigate certain topics and/or questions in more detail.

Does anyone have any questions before we begin?

RQ1 Questions: Fidelity of Training to Recommended Best Practices

1. What was the purpose of the training?
Prompt: Were you trained on how to deliver instruction in both the kinesthetic lab and ABL?
Prompt: Do you feel the training focused on one more than the other?
*Based on this response, I will either combine or break down ABL and kinesthetic lab questions

2. What activities and/or learning experiences were provided during the training?
Prompt: How were these activities similar/different from other trainings you have attended at your school?

3. In what order did these activities take place?
Prompt: Did each activity build off the last activity (progression) or was each activity independent of each other?
Prompt: Were you allowed the opportunities to practice skills and strategies during the training?

4. How would you summarize the content provided during the training?
Prompt: Did you find the information useful and/or relevant to your classroom? Why or why not?
Prompt: After this training, did you feel using the ABL and kinesthetic lab would be beneficial to your students?

5. Did you perceive the training to be beneficial in promoting your effective use of the kinesthetic and activity lab? Why or why not?
Prompt: Were you trained on the kinesthetic lab and activity lab independently of one another?

RQ2 Questions: Participant Perspectives of the Training

1. What were your perceptions of the strengths of the kinesthetic and activity lab training?
Prompt: What did you like about the training?

2. What were your perceptions of the limitations of the kinesthetic and activity lab training?
Prompt: What did you dislike about the training?

3. What are some ways the kinesthetic and activity lab training could be improved?
Prompt: What activities/learning experiences would you have added or taken away from the training?

4. If a neighboring school were to implement a kinesthetic and activity lab, would you recommend this training? Why or why not?
Prompt: Would you recommend this training to others schools thinking of implementing a kinesthetic or action based learning lab.

Figure 5.1. Teacher Focus Group Interview Protocol

Chapter 6

Discussion

This dissertation entails three studies that advance the literature base of school based physical activity, specifically movement integration (MI) in a low socioeconomic (SES) elementary schools. Study One identified the nature and extent of MI in a low SES school district. Study Two identified the association between children's participation in school physical activity (PA) opportunities and classroom conduct in one low SES elementary school. Study Three was conducted in the same school as Study Two and determined the level of fidelity between an MI training delivered to the school and recommended best practices while also identifying training participants' (i.e., classroom teachers, lab supervisors, principal) perceptions of the training. The subsequent discussion will explore how the results from these three studies support the use of MI as a PA promotional strategy in low SES schools.

MI in the Classroom

The findings from Study One suggest that teachers in low SES schools utilize direct movement less than 15% (M = 14.3%) of the time during their normal classroom instruction. However, students may be participating in more movement in the classroom than previously assumed as a result of non-directed PA opportunities, such as non-teacher directed transitions and physical environment design (i.e., strategically placing materials around the classroom in promote movement). Students were found to participate in

almost double the amount of non-teacher directed movement (M = 26.9%) during observations when compared to teacher directed movement. Overall, students were observed participating in MI 41.3% of regularly scheduled class time. These findings suggest that MI may occur more frequently in low SES elementary school classrooms than previously assumed but this movement is not identified due to its non-teacher directed nature. Teachers may already be facilitating non-teacher directed transitions naturally in their daily routine and protocols but do not self-report these types of MI because they are unaware of how much movement these routines and protocols generate or possibly because they do not believe this information is to PA promotion. Therefore, more systematic observation using valid and reliable instruments to investigate the amount of MI occurring in low SES classroom is needed to strengthen the knowledge base of current MI levels in elementary schools.

In Study Two, the scan protocol to measure student off-task behavior provided data on the whole classroom with each scan, which arguably portrays a more complete picture of off-task behavior than focal child protocols used in previous research. Additionally, teacher redirects were shown to be a suitable, teacher-driven proxy measure for student off-task behaviors. Teacher-driven measures of student behavior have the potential to be more contextually grounded and aligned with teacher-specific criteria for classroom conduct, Findings also supported the use of classroom movement breaks in low SES schools due to their positive association with reducing student off-task behavior. These results align with previous studies supporting the idea that student participation in classroom-based PA has a positive association with students' attention to learning tasks while in general education classrooms (Goh et al., 2016; Grieco et al., 2009; Grieco et

al., 2016; Mahar et al., 2006). Movement breaks in traditional general education classrooms were more beneficial at increasing student desired classroom behaviors than other school PA opportunities including time in physical education, recess, and movement facilitative classrooms, possibly due to the increased transition times from these other opportunities back to the regular classroom setting. Increased transition time could lead to an increase in behavioral problems (Barbetta, Norona, & Bicard, 2005), which could in turn mitigate the benefits of student participation in PA.

Study Three demonstrated that current MI training efforts lack alignment with current best practice recommendations for professional development. The MI training delivered to a low SES Title 1 school to promote MI in the classroom and through the use of movement facilitative classrooms met less than half (42%) of the current recommendations developed by Desimone (2011). Results also highlight the notion that classroom teachers support the design of MI trainings that have more contact hours and provide teachers with opportunities to make presentations and receive feedback. Teachers further expressed the desire for supplemental resources to make MI easier and more grade/subject specific focuses to MI trainings that provide more relevant trainings to teachers based on their students' needs.

Strategies to Increase MI in Low SES Schools

The studies included in this dissertation highlight three specific strategies that have the potential to increase MI use by classroom teachers in low SES schools: (a) increasing the MI knowledge base through systematic observation, (b) using a university service learning (SL) approach to provide teachers with authentic demonstrations and

external support for MI, and (c) using a community-based participatory research (CBPR) approach in the design of MI professional development trainings.

MI knowledge base. Previous research has identified a need for more systematic, objective measurement of MI in schools (Russ et al., 2017; Mahar et al., 2011). However, previous research focusing on the use of MI in elementary schools have mostly used subjective, teacher-self report data collection methodology (Bartholomew & Jowers, 2011; Cradock et al., 2014; Howie et al., 2014; Webster et al., 2013) which has been found to be limited and even misleading when reporting PA data (Sallis & Saelens, 2000: Troiano et al., 2006). Researchers and teachers attempting to maximize the extent and nature of MI in low SES elementary schools need to be able to accurately identify current levels of MI and objectively measure changes in MI when research efforts incorporate PA promotional strategies. Using systematic observation tools designed to capture MI, such as the System for Observing Movement in Academic Routines and Transitions (SOSMART), will

> reveal how to maximize the value of routine classroom practices to align academic and health goals in school and help build the evidence based needed to establish clear benchmarks for MI and advance recommendations for best practices in classroom teaching and school-based PA promotion. (Russ et al., 2017, p. 313)

Service learning approach. A university service learning approach (Carson & Rague, 2014; Galvan & Parker, 2011; Himelein, Passman & Phillips, 2010; Webster, Beets, et al., 2015) is also a potential strategy to increase MI in low SES schools.

Researchers believe a viable, logical approach to increasing the frequency and nature of MI in schools is access to inservice professional development and preservice undergraduate education learning experiences focusing on effective and efficient strategies to implement MI. It is crucial for professional development providers to evaluate their trainings efforts to identify MI training best practices (Guskey, 2002). Along with teacher recommendations for future MI trainings, research has identified many classroom teacher perceived barriers to MI, such as lack of time, perceived personal confidence for using MI, and a lack of relevant professional development (Benes, Finn, Sullivan, & Yan, 2016; Michael et al., 2018; Webster et al., 2015). These challenges may be especially pronounced and prevalent in low SES schools.

CBPR approach to MI training design. Another potential strategy to increasing the relevancy, effectiveness, and efficiency of MI trainings is to utilize a CBPR approach (Israel, Schulz, Parker, Becker, & Allen, 2003) to MI training design, which allows researchers and school community members to collaboratively identify key problems and increase community ownership for program and information gathered, which in turn can increase the sustainability of school programs. In reference to the findings of Study Three, a CBPR approach to MI training could serve to more closely align training participants' (i.e. lab supvisers, principal, teachers, lab designer) perceptions about the purpose of the MI training, ensure the learning experiences reflect the teachers' professional priorities and values, and motivate the teachers to adopt what they learned in the training (Israel, Schulz, Parker, Becker, & Allen, 2003).

In summary, providing MI training for inservice classroom teachers and SL approaches that benefit both inservice and preservice teachers' experience and support

regarding MI promotion may offer valuable strategies to increasing the use of MI in elementary schools from low SES districts. As a result of MI being shown to have physical, cognitive, and social benefits in elementary school children, research designed to increase the frequency, efficiency, and effectiveness of MI is needed. Future research is needed to identify and provide support for best practices associated with MI training design and intervention approaches to increasing the use of MI in elementary schools and identify training efforts with teacher fidelity of implementation of training content.

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Appendix A: Sosmart Description

SOSMART: System for Observing Student Movement in Academic Routines and Transitions

Technical Description

SOSMART is conceptualized as a two stage decision system.

Stage 1. Classroom teacher involvement.

The first phase requires a decision to be made about the involvement of the classroom teacher by answering the following question: Did the classroom teacher give a direction to be active?

If YES: The observer moves on to code teacher involvement behaviors (teacher directive variables, instruction variables, and movement variables), then proceeds to Stage 2 (student response variables).

The teacher directive **(TD)** variables describe who was in charge when the directive was given: *regular classroom teacher **(ct)** or other **(o)***.

The instruction variables describe how the teacher gave the direction: teacher-led **(T)** or technology-led **(C)**. If it was teacher-led **(T)**, the following context variables are also identified: verbally **(v)** and/or with demonstration **(d).**

The movement variables classify the activity into one of four different categories: a reward or incentive **(R)**, an opening activity **(O)**, a teacher-directed transition **(TT)**, or other movement **(OM)**. Within these categories, the following context variables are also identified:

- A OM can be infused with academic content **(a)** or non-academic **(na)**. If the OM is **(a)**, the academic content should be coded: language arts **(la)**, math **(m)**, science **(s)**, social studies **(ss)**, or other **(o)**.
- A TT is when the teacher has students walk from point A to point B. If the teacher has students do *anything more than walk* normally from point A to point B (i.e. any other locomotor movement (run, hop, skip) and/or modifies the movement to increase activity (walk by taking 21 steps), it is coded with a **(+)** to denote a TT with added activity.

If NO: The observer moves on directly to code Stage 2 (student response variables).

Stage 2. Student response.

The second phase requires a decision to be made about the response of the class by answering the following question: How did students respond?

If YES to Stage 1: The observer records what part of the class is active (whole class **(W)**, part class **(P)**, or small group **(G)**). Context variables identify how much of their body is active (upper body only **(ub)**, lower body only **(lb)**, or full body **(fb)**) and off-task behavior **(o)**.

If there is a student who cannot participate (due to disability or injury), please make a note in the comment section on the coding form and exclude this student from your coding (i.e. do NOT count this individual as 'inactive').

If NO to Stage 1: The observer records what part, if any, of the class is active (whole class **(W)**, part class **(P)**, small group **(G)**, or none **(N)**) and the observable reason for that movement (as a result of something in the physical environment **(E)** or as a result of a non-teacher directed transition **(NT)** like getting supplies or using the bathroom). Within these categories, context variables identify if the NT reflects added activity **(+)** and/or off-task behavior **(o).**

Appendix B: Sosmart And Teacher Redirect Observation System Protocol

1.1 SOSMART & ON/OFF Task Observational System

The On OFF Task and teacher redirect system is conceptualized as a two- phase decision system. Observers will first code for then for physical activity contexts and then student On OFF Task behavior and Teacher Redirects. Each phase will include a 10 second scan followed by a 10 second record which makes the entire sequence a 40 second observe/record interval.

1.2. Terms

1. **Scan**: One 10 second scan moving eyes from left to right.
2. **Record**: One 10 second interval immediately followed by observation entry into a Systematic Observation form (KidsFit Observation Form *** or KidsFit Exit Form***) on a tablet.
3. **KidsFit Observation Form**: The digital form filled out on a tablet for every 10 second scanning interval.
4. **KidsFit Exit Form**: The digital form completed any time the class you are observing leaves location you observing (except for PE or Recess)
5. **Reliability Scan**: A scan completed simultaneously by two or more data collectors, but recorded separately and without input from the other data collector(s).
6. **On Task Behavior:** a student's behavior is considered on-task if he/she is attentive to the teacher or actively engaged in the appropriate task, as assigned by the teacher (Hannon, Webster, Podlog, Newton, (2016).
7. **OFF task behaviors:** a student's behavior is considered off-task if he/she is:
    - Not paying attention to the task assigned by the teacher
    - Off-task movement (e.g., leaving desk without permission)
    - Off-task talking (e.g., talking about something not pertaining to the assigned task)
8. **Teacher Redirect of Student Behavior:** any occurrence, both verbal and non-verbal behaviors, which attempt to redirect or change student behavior from off-task to on-task. Teacher redirects can come in form of, but not limited to:
    - Non-verbal gestures (e.g., points, staring, etc.)

- Verbal redirects (e.g., calling student's name, reminding the student what on-task behavior is, or saying " I like the way Glenn is sitting quietly at his desk" in an effort to get other)
- Proximity: the act in which the teacher positions themselves closely to a student that is off-task in an effort to encourage the student to redirect behavior to on-task.

9. **Physical Activity (PA):** any type of movement that results in caloric expenditure. Note: Standing up is not considered physical activity, nor is sitting on an exercise ball.
10. **Reward:** teacher provides physical activity as an obvious reward for providing a correct response or behavior in class.
11. **Opening Activity:** physical activity was directed by the teacher within the first 10 minutes of the official start of the school day, followed by a class response resulting in student activity (e.g., a school-wide morning exercise, etc).
12. **Types of PA:**
    - **Teacher Direct (TD) Transition:** if the teacher gives a direction for students to be active resulting in students moving from point A to point B (e.g., desks to carpet) or between finishing one task and getting ready for the next task (e.g.., putting away supplies and/or transitioning from one instructional content to another instructional content). Note: Stand up behind your desk is not coded as PA or as a TD
    - **Non-Teacher Directed (Non-TD) Transition**: if the teacher did not give a directive for students to be active, but the student(s) still engaged in physical activity (e.g., getting up to sharpen pencil, going to the bathroom).
    - **Academic Movement:** movement related to course content directed by the teacher within a lesson or between lessons, followed by a class response resulting in student activity (e.g., doing jumping jacks and reciting multiplication facts, body spelling, etc.).
    - d**) Non-Academic Movement:** movement NOT related to course content directed by the teacher, within a lesson or between lessons, followed by a class response resulting in student activity (e.g., brain breaks, exercise breaks, etc.).
13. **PA facilitation:** Who or what facilitated the PA?
    - **Teacher facilitated (Teacher):** if a classroom teacher instructed the children to be active while in the academic classroom environment.
    - **Technology facilitated (Technology):** if a classroom teacher utilized technology to get the children active while in the academic classroom environment
    - **Equipment:** if equipment used by students is facilitative of movement, resulting in student activity, regardless of level of intensity.

14. **How Many Students are Using Active Equipment:** equipment designed to facilitate movement during participation in course content.
15. **Class Content:** content the classroom activities were designed to focus (on exit form).
16. **Physical Activity that Prepares the Brain for Learning:** any activity prior to academic content to prime students for learning.
17. **Physical Activity that Supports Exercise or Fitness:** any activity that elevates children's heart rate, makes them sweat, or breathe heavily.
18. **Physical Activity that Supports Class Cohesion:** any activity that builds class unity or cohesion.

1.3 Observation Form Protocol

When Used: Complete this Observation Form Protocol when students are in (a) the classroom (e.g., this can be art room, library, regular classroom, etc.), (b) the active lab, (c) or the kinesthetic lab. Do not complete this form during PE or recess. During those times complete SOFIT+

Equipment Associated: Tablet for recording. Ear buds, smart phone, audio recording loaded on smart phone.

Tablet Instructions:

1. Access the Pendragon Forms icon on the tablet's main screen.
2. Press the Launch button.
3. Select Observation Form
4. Press  to begin a new form on the tablet.
5. Press Start on the Audio Recording File located on your smart phone. Listen to the introduction and move
   # 6 when the audio file says **"Observe"**
6. **Phase 1:** Perform a 10-second systematic observation scan of the room observing for:
   a. Did PA occur? Options (yes/no)
   b. Was PA a reward? Options (yes/no)
   c. What type of PA occurred? Options (Not Applicable, TD Transition, Non-TD Transition, Academic Movement, Non-Academic Movement)
   d. How was the PA facilitated? Options (Not Applicable, Teacher, Technology, Equipment)
   e. How many students are using active equipment? (count the number of students using the active equipment).

7. When the audio file says **"Record"** Record your observations of a –e in the tablet. Then press Next >.
8. **Phase 2:** When the audio file says **"Observe,"** perform a 10-second systematic observation scan of the room observing for:
    f. Did the teacher redirect student behavior? Options (yes/no).
    g. How many students are off task? (enter # of students off task)
    h. Was this reliability? Options (yes/no)
9. When the audio file says **"Record"** record your observations of f-h in the tablet.
10. Press End to complete the form.
11. Press + to begin a new form on the tablet.
12. Repeat steps 4-11 continuously until students leave the class.

2.1 Exit Form Protocol

When Used: Complete the Exit Form when the students (a) leave the classroom (e.g., this can be art room, library, regular classroom, etc.), (b) leave the active lab, (c) kinesthetic lab, or (d) leave the classroom at the end of school day.

Equipment Associated: Tablet for recording.

Tablet Instructions:

1. Access the Pendragon Forms icon on the tablet's main screen.
2. Press the Launch button.
3. Select Exit Form
4. Press + to begin a new form on the tablet.
5. Record the answers to the first set of questions in the tablet:
    a. Enter Classroom Teacher Name (Type in Classroom Teacher's Last Name)
    b. Select Grade Level (1st, 4th 5th)
    c. Enter the Number of Students (Type in Number of Students)
    d. Select if there is a substitute teacher (yes/no)
    e. Describe off task behaviors observed (type in all types of off task behaviors you saw (e.g., students talking, staring off in space, etc.)
    f. Was there an activity to prepare the brain for learning? (yes/no)
6. Then press Next >.
7. Record the answers to the second set of questions in the tablet:
    g. Was there an activity that supports exercise or fitness? (yes/no)
    h. Was there an activity that supported class cohesion? (yes/no)
    i. If academic movement observed, into which content was it integrated? (Math, Language Arts, Social Studies, Science, and Other) *Note: Select all that apply

- If other, describe the content observed in the text box marked “Other describe.”

8. Then press 

.
9. Record the answers to the second set of questions in the tablet:
   j. Did you complete reliability scans? (yes/no)
   k. Who completed reliability scans? (click the person(s) names that completed scans with you
10. Press 

to complete the form.

APPENDIX C: DATA COLLECTION PROCEDURES MANUAL

Table of Contents

Project Location: Burton-Pack Elementary School**:** 111 Garden Drive, Columbia, SC 29204

Project Description: We will be observing two classrooms from first grade, fourth grade, and fifth grade. We will observe these classes for one full week in the fall and in the spring. During the observation week, we will start our observations at the beginning of the school day and observe the class for the entire school day. We will use two different systematic observation systems to observe the classrooms. During Physical Education and Recess we will use the System for Observing Fitness Instruction Time Plus (SOFIT+) and during classroom time we will use the KidsFit Observation Tool. The KidsFit Observation Tool will be used in the classroom and when students are with their intact class and in other areas of the school except lunch (e.g., in the library, art class, music class, special events). During observation weeks, both classes in a grade level will wear the accelerometers, but we will only observe one of the classes per grade level. Below is the schedule with the classes we will be using:

Fall 2016		Spring 2017	
Phase 1.A 9/19-9/23	Phase 1.B 11/14-11/19	Phase 2.A April	Phase 2. B. April
1st grade A	1st grade B	1st grade A	1st grade B
4th grade A	4th grade B	4th grade A	4th grade B
5th grade A	5th grade B	5th grade A	5th grade B

1. Preparing For Data Collection

a. Instructions for leaving to deliver equipment and observe in the morning

i. Check the data collection schedule for the classrooms you will be going to and your team number for the day. (One classroom wearing accelerometers and one classroom wearing accelerometers **and being observed**)

ii. Plan to arrive at the school 15 minutes prior to the start of data collection and dress in a way that positively reflects USC.

iii. Prior to leaving for the school use the Morning Checklist (page 9) and the Data collection Check Out Sheet (page 13) to collect all of the equipment you will need. Equipment Needed: tablet, 25 wrist straps, 25 accelerometers, clipboard, Morning Checklist, Observer Checklist(s) (page 10), Afternoon Checklists (page 11), Data Collection Form, book bag, data collection resource binder, smart phone, ear buds.

iv. The Data Collection Check Out sheet will be located in Room 129 on the clipboard hanging on racks above your designated team number.

v. The Morning Checklist, Observer Checklist, Afternoon Checklists, and Data Collection forms will be in the plastic filing box labeled KidsFit.

vi. The black book bag, tablet, clipboard, accelerometers, tablet charger, and data collection resource binder will be located on the shelf that corresponds to your team number.

vii. When you arrive at Burton-Pack Elementary School, park in the visitor parking area and check in with the main office. **Make sure you have your driver's license and USC ID.**

viii. Ask the main office if there is a substitute teacher for your assigned classroom. If there is, text Greg (803) 312-5623 immediately.

ix. After checking in at the main office, go to the classroom while continuing to follow and fill out the Morning Checklist.

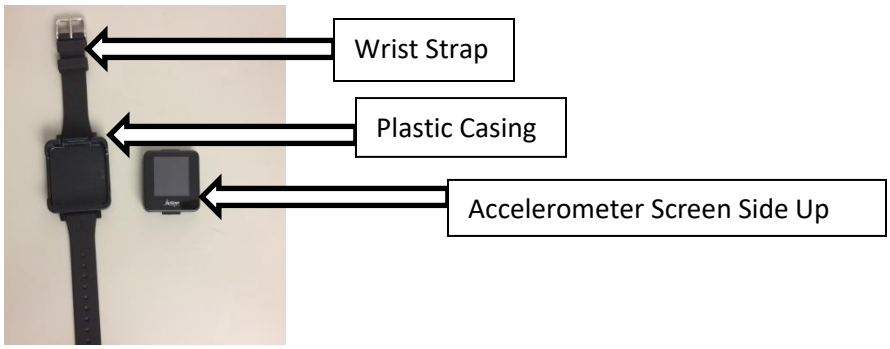
x. Go to classroom that you are not observing in first.

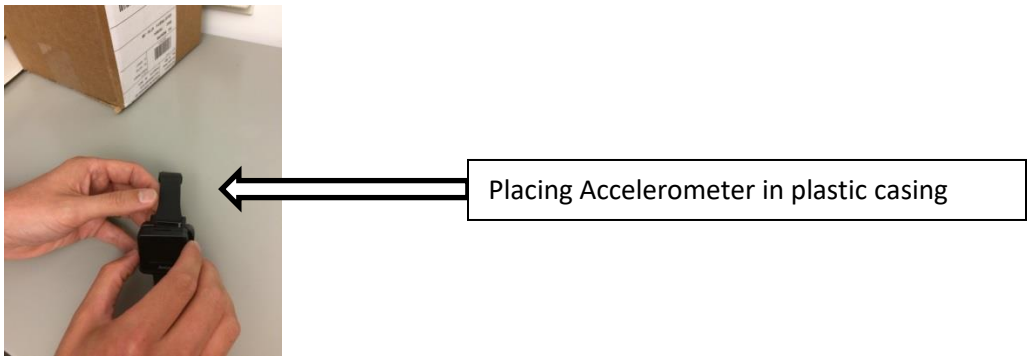
xi. Do not enter the classroom unless the teacher is present

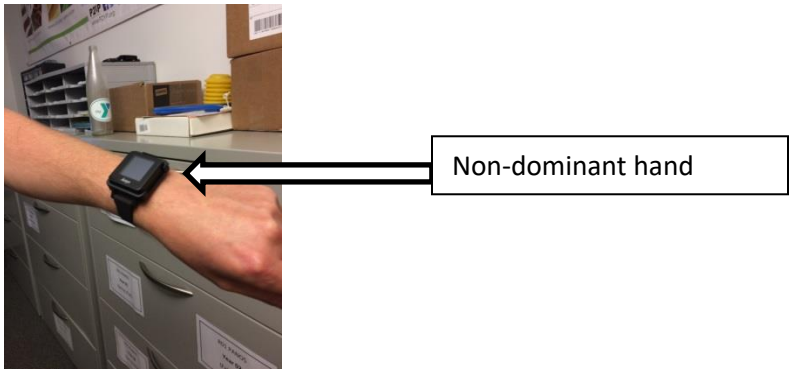
xii. When you arrive in the classroom, introduce yourself to the teacher, get out the data collection sheet, fill in required information (name, date, team number, etc.) check to see which students are approved to be wearing accelerometers, if students are not approved to be wearing accelerometers **NO BELT** will appear next to their name, assign each student an accelerometer, and then observe the teacher putting the accelerometers on the students. Fill out corresponding information for each student (race, gender, age, etc.)

xiii. Take equipment with you, leaving the data collection form with the teacher, and proceed to classroom you are observing in and repeat step xii.

xiv. Accelerometers: First insert accelerometer into wrist strap by gently pushing on the accelerometer into the plastic casing. Make sure you place the accelerometer in the casing screen side up. Have students put the accelerometer on their non-dominant hand. Hint: Young students don't understand what their non-dominant hand is, so ask which hand they color/write with and then place accelerometer on opposite arm.







b. Equipment (Data Collection Kit)

i. 1 accelerometer bin with number of accelerometers written and team number labeled on lid of bin (with two bags inside, one for each classroom with number of accelerometers inside bag labeled)

ii. 2 wrist strap plastic bags with number of wrist straps and team number written on top

iii. 1 black Book Bag with the following inside of it
   a. Clipboard
   b. Data collection resource binder
   c. Pens/pencils

iv. Data Collection Sheet

v. Morning Checklist
vi. Observation Checklist (check to see how many observers are scheduled for the day and take the corresponding amount of observation checklists).
vii. Afternoon Checklist
viii. **You must bring your own: ear buds, smart phone, and photo ID**.

2. Data Collection Procedures and Protocols

a. Departing for site:

i. Make sure the equipment has been checked out on the Equipment Check Out form that is hanging on the clipboard on the rack.
ii. Arrive at the school 15 minutes prior to recording, park in approved parking, and have photo Id. Check in with school office and then proceed to assigned classroom.

b. Putting Accelerometers on Students

i. First, go to the classroom that you will **NOT** be observing. Do not enter the classroom unless the teacher is present.
ii. Pull out data collection form and assign the accelerometers to the students who have permission to wear them and put all accelerometers on wrist straps with screen facing outward.
iii. When the teacher is ready, observe the teacher putting on accelerometers on student's non-dominant hand. Fill out corresponding information in the data collection form for each student (i.e. gender, race, time on)
iv. Leave the data collection form with the teacher asking him or her to take the accelerometer off and record the time if a student leaves school before the school day ends. Inform the teacher someone will come to collect the accelerometer by the end of the day.
v. Proceed to classroom that the observation will be taking place.
vi. Repeat steps i-iii in classroom that the observation will be taking place.

c. Observing in the classroom:

i. When entering the classroom do not interrupt the teacher, but find a place where you can be out of the way but still observe all students in the classroom. If you are not the first observer, then use the data collection sheet to ensure that all students are wearing the accelerometers correctly. If there is an observer in the classroom already, quietly ask them if there is anything you should know and the information that you will need to fill out the KidsFit Exit form.
ii. Start your own Observation Checklist

iii. Get out tablet, ear phones, smart phone (make sure it is silenced), open the KidsFit form in Pendragon, start the Audio File located on your cell phone, and begin your observation.
iv. If the class leaves the classroom fill out the KidsFit Exit Form. You do not need to do this if they take a bathroom break.
v. Use the KidsFit Form to observe in all classroom settings.
vi. Fill out Classroom Observation Form (using pencil and paper) identifying lesson start/end time and lesson type.
vii. When a group of students are sent to the Kinesthetic Lab, complete a KidsFit Exit form and accompany the group to the Kinesthetic Lab to complete observation. Note the time on the data collection form.
viii. Continue observations in the Kinesthetic Lab. (KidsFit Observation Form)
ix. At the end of lab time, ask the teacher what students are present in the lab. Mark students that were in the Kinesthetic Lab group and time in and time out on the data collection form as well.
x. Fill out KidsFit Exit Form upon leaving the Kinesthetic Lab.
xi. Upon arrival at classroom enter quietly and at an appropriate time, ask the teacher what content and activities occurred in the classroom while you were gone.
xii. Begin observation using KidsFit observation form.
xiii. If a student that is wearing an accelerometer leaves school for any reason, make sure to collect their accelerometer.

C. Observing in PE and recess

i. Find a place where you can be out of the way but still observe all students.
ii. Get out tablet, open the SOFIT + form in Pendragon and begin your observation.
iii. When the class leaves PE or Recess, fill out the SOFIT+ Exit Form
iv. Note: We will use SOFIT+ during indoor recess even though it may occur in the classroom
v. If a student is wearing an accelerometer leaves school for any reason, make sure to collect their accelerometer.

d. Completing a Shift if you are not last person to observe for the day

i. When the person comes to replace you:
    a. Notify the person of anything they need to know.
    b. Provide them information they need for KidsFit Exit form if they are relieving you during an observation.
    c. Complete your Observation Checklist making sure to include information in the field notes section and place on clipboard in black book bag.

e. Completing a Shift if you are the last person to observe for the day

i. Fill out the appropriate Exit List on the Tablet when the students leave school for the day (if in classroom KidsFit, if in PE- SOFIT+)
ii. Complete Observation Checklist and place on clipboard
iii. Follow the Afternoon Checklist (see next section)

3. Collecting and Returning Equipment

i. Use the Afternoon Checklist to guide you.
ii. Collect all accelerometers from both classrooms, mark the time you took them off on the data collection sheet, and count to make sure you have all accelerometers and wrist straps. If the numbers do not match, recount and if they still do not match consult the data collection sheet to see which number is missing. Inform the teacher, and ask them to contact the parents of that child if one is missing from data collection sheet. Let the teacher know we will pick up the accelerometer at a later date. Then call Greg (803) 312-5623.
iii. Bring all equipment, the data collection sheet, and the checklists back to the Arnold School of Public Health Room 129.
iv. Follow the Afternoon Checklist procedures and return all equipment, checklists, and data collection forms in Room 129.
v. Return accelerometers bin with bags inside to designated team rack in Room 129.
vi. Return book bag to designated team rack in Room 129.
vii. Return forms to plastic filing box labeled KidsFit. Be sure to place in the completed forms section.
viii. Leave the notebook and clipboard in black Book Bag.
ix. Missing or Damaged Accelerometer (see section 4)
x. Sync the Tablet (for specific instructions see section 5).

4. Missing or Damaged Accelerometer(s)

A. Missing Accelerometers:

I. Contact Greg (803) 312-5623 and fill in correct information on Equipment and Data Collection Check Out/In Form

B. Damaged Accelerometers

I. If accelerometer damage is suspected (for example: red LED light flashing)
   a. Place in Tupperware labeled damaged accelerometers and call Greg (803) 312-5623 and fill in correct information on Equipment and Data Collection Check Out/In Form

5. Tablet Checklist and Syncing Tablet

A. Syncing the Tablet

I. This can only be done with a connection to Wifi and should be done when you return to Arnold School of Public Health.
II. Open Tablet Case.
III. Turn the Tablet on (button is located on upper right side of tablet, you may have to hold for a few seconds).
IV. Swipe finger across bottom of screen to unlock.
V. Press Button for Pendragon Forms (green icon lower bottom).

VI. Click " Yes, I have Pendragon Forms".

VII. Click " Sync".

VIII. If it does not sync , go to settings then Wifi and click on "guest" and then click "forget network" then click on "guest" and retry syncing.

IX. If it does not work, please contact Greg (803) 312-5623.

Morning Checklist

Team Number:_____ Date:_____ Your Name:_____

Items to complete prior to leaving for the site	Check if Completed
Check School information form to see your team number for the day and how many observers will be in the classroom during the day.	☐
Collect accelerometers and wrist straps from PHRC Room 129 in appropriate bin on rack (team number) count how many accelerometers are in the bin, the number should match the label on the top. If it does not, make a note on the equipment checkout sheet and in the field notes section of this form.	☐
Collect accelerometer data collection form for both teachers PHRC Room 129. Make sure you pull the sheet for the correct class you are observing. The students' names will already be on data collection form. Place the data collection sheets on the clipboard in your teams' book bag.	☐
Collect the correct number of Observation Checklists (one for each team member) and an Afternoon checklist and place on the clipboard in your teams' black book bag.	☐
Collect the Black Book Bag and ensure that the following items are in book bag: • Clipboard • Tablet • Data Collection Forms • Data Collection Resource Binder • Observation Checklist(s) • Afternoon Checklist	☐
Bring your driver's license, ear buds, and smart phone	☐
Initial and place team number on the equipment sign in and out sheet	☐

Upon arrival school (15 minutes prior to start of school)	Check if Completed
Check in to front office, and ask if there is a substitute for your assigned classroom. If so, text Greg (803) 312-5623.	☐
Go to classroom you are not observing in, assign accelerometers to students by filling in corresponding number to the student name on the data collection form, and place accelerometers in plastic casing, screen up, on wrist straps.	1st Class☐ 2nd Class☐
Give accelerometers to appropriate teachers and observe accelerometers being put on students	1st Class☐ 2nd Class☐
Fill out the Data collection sheet as the students are putting on the accelerometers. Make sure all information is filled out including information at the top (date, student demographic information)	1st Class☐ 2nd Class☐
Check to make sure all students have accelerometers on correctly and data sheet is filled out correctly (student's name, accelerometer number, time on)	1st Class☐ 2nd Class☐

Go to classroom you are observing in and repeat steps above	☐
Find a place to start your observation where (a) the book bag can be stored (b) you are out of the way but (c) you can see all students and teacher	☐
Fill out anything of consequence in field notes section (this section should always be filled out)	☐
Leave this form on clipboard behind data collection form when completed	☐

Field notes

Observation Checklist

Team Number:_____ Date:_____ Your Name:_____

Items to complete prior to leaving for the site	Check if Completed
Make sure all equipment has been brought to school	☐
Bring your Driver's License, ear buds, smart phone with audio file downloaded	☐

Upon arrival school (15 minutes prior to start of observation period)	Check if Completed or Write NA if it is not Applicable
Check in at the front office and proceed to the location of your observation	☐
If you are relieving someone, and it is not during a transition (students leaving location and going to another location), obtain information from observer you are relieving that you will need to fill out Exit Form on tablet.	☐
Check to make sure all students have accelerometers on correctly and data sheet is filled out correctly (student's name, accelerometer number, time on).	☐
Find a location to observe, that is out of the way, but allows you to see all students and teacher in classroom.	☐
Continuously fill out classroom observation form.	☐
Get out Tablet, ear phones, smart phone (make sure it is silenced), If you are NOT in PE or at RECESS open the KidsFit program in Pendragon, start the Audio File with ear buds plugged into phone, and begin your observation. If you are in PE or at RECESS, follow the same steps but open the SOFIT+ form in Pendragon.	☐
In the classroom, observe for 30 minutes (the length of the audio file), take a 5 minute break, and resume until (a) you are relieved or (b) the students leave the classroom.	☐
In PE and at Recess, observe for the entire lesson without taking a break.	☐
When the class leaves the classroom, PE, or recess fill out the appropriate EXIT FORM (classroom-KidsFit Exit Form, PE and Recess SOFIT+ Exit Form)	☐
If a student leaves for the day during the time you observing, collect their accelerometer and write down the time on the Data Collection Sheet	☐
The students may talk to you or be interested in what you are doing. Be polite and brief and direct them to their teacher if they have a question or to what they are supposed to be doing at the time.	☐
We will not observe during lunch or during official standardized academic testing. If you are observing during lunch, ask the teacher where you can eat your lunch or wait for the class to return to the classroom. Note, many classes go directly from lunch to recess. If testing occurs, call Greg (803) 312-5623	☐
Thank classroom teachers, PE teacher, other teachers, and front office for allowing us to be there	☐
Record anything of consequence in the field notes section below (there should always be something)	☐

Leave this form on the clipboard behind the Morning Checklist	☐

Field notes

Afternoon Checklist

Team Number:_____ Date:_____ Your Name:_____

Items to complete prior to leaving for the site	Check if Completed
Make sure equipment has been brought to school, and double check your team number	☐
BRING YOUR Driver's License	☐

Upon arrival school (15 minutes prior to the end of school)	Check if Completed
Collect accelerometers from appropriate teachers and place in appropriate bag and mark the time on the Data Collection sheet that the accelerometers were taken off.	1st Class☐ 2nd Class☐
Collect data collection sheet from appropriate teachers	1st Class☐ 2nd Class☐
Check to make sure data collection sheet is filled out correctly (student's name, accelerometer number, time on, time off)	1st Class☐ 2nd Class☐
Count the number of accelerometers and wrist straps and make sure number matches number the number labeled on bag. If the number doesn't match, check Morning Check List to see if one was missing and double check data collection sheet to make sure all accelerometers were taken back up. If there is no information on Morning checklist, recount. If the number still does not match, inform the teacher of which belt is missing (from data collection sheet) and which child has the belt. Tell the teacher that a member of the KidsFit team will pick up the accelerometer later in the week. Then call Greg (803) 312-5623	1st Class☐ 2nd Class☐
Check to make sure all equipment is in back pack and take this with you	1st Class☐ 2nd Class☐
Check with classroom teachers, PE teacher, and front office to ensure everything went smoothly and there is no equipment left from our visit that day or previous days (i.e., tablet, accelerometers)	☐
Thank classroom teachers, PE teacher, and front office for allowing us to be there	☐

Upon returning to PHRC	Check if Completed
Return accelerometers to the designated team location on the rack.	☐
Staple the Data Collection Sheet, Classroom Observation Form, Morning Checklist, Observation Checklist(s), and Afternoon Checklist together and place plastic bin labeled KidsFit. Be sure to place in section marked completed forms.	☐
Sync Tablet	☐

Return tablet to the rack and plug into the designated team charger.	☐
Leave clipboard and data collection resource binder in book bag and put book bag to designated team location on the rack.	☐
Record anything of consequence in the field notes section below (there should always be something)	☐

Field notes

Equipment and Data Collection Check Out/In Form

Instructions:

1. After collecting all of your equipment, write your name in the name column fill out the column corresponding columns (team number, date and time out)
2. Upon returning from data collection, write your name in the name column corresponding with your team number and date and time checked out
3. Record the numbers of any missing accelerometers in the missing column corresponding to the date and team from which the accelerometers are missing or damaged. Write N/A if it is not applicable.

Name	Team Number	Date/Time Out	Date/Time In	Missing or Damaged Accelerometer Numbers (including classroom and students name where located.)
Check Out: Greg Check In: Cate	3	4/23/16 7:00 am	4/23/16 4:03 pm	Accelerometer 422 missing in Mr. Weavers class student Collin Webster has accelerometer
Check Out: Check In:				
Check Out: Check In:				
Check Out: Check In:				
Check Out: Check In:				

Classroom Observation Form

Team NUMBER:_____
Date:_____
Teacher Name:_____

Lesson Type	Start Time	End Time		Lesson Type	Start Time	End Time		Lesson Type	Start Time	End Time

Appendix D: Parental Informed Consent

Evaluating the Effects of KidsFit Kinesthetic Classroom and Kinesthetic Lab

Tony Boatwright, Principal Investigator
Richland County School District One Health and Physcial Education Coordinator

Introduction
We at Burton-Pack Elementary and Richland One School District have teamed up with the University of South Carolina to conduct an evaluation of the KidsFit Kinesthetic Classroom and Kinesthetic Lab that has recently been installed at Burton-Pack Elementary. The Kinesthetic Classroom is outfitted with a variety of active desks that will allow children to move whenever they need to throughout the school day. The Kinesthetic Lab includes equipment that will allow children to review content they are currently covering in their classroom while being active. Students at Burton-Pack will rotate through the lab for short academic activity sessions (~30 minutes) once per week. The school district is neither sponsoring nor conducting this research. The results of this study will help to inform school professionals and policy makers about how best to increase physical activity opporutnities for students, school staff, and parents, and what the effects of the KidsFit equipment are on school outcomes.

Purpose of Study
The purpose of this study is to evaluate the effects of the KidsFit Kinesthetic Classroom and Kinesthetic Lab on students discipline referrals, and test scores (Reading, Writing, Math, English).

Description of Study Procedures

1) All classes at Burton-Pack Elementary School are eligble to partcipate in the study. All children in each of these classes, and their teachers are elligible to participate in this study.

2) In the coming academic year your child's schedule will include a 30 minute period once per week where they will be active while reviewing academic content aligned with classroom learning objectives for that week. This time will be lead by a resource teacher that will draw upon student academic data from mastery connect to align content in the Kinesthetic Lab with student needs.

3) Your child's classroom lessons may be observed on several occasions. Observations will be conducted from the back of the classroom in the most unobtrusive way possible.

4) Your child may also receive a small activity monitor to wear on their wrist on several occasions throughout the school year. Your child will receive the activity monitor before the start of the school day and return the monitor at the end of the school day.

5) The researchers will analyze data collected from the observations and activity monitors to understand the impact of the Kinesthetic Lab on students' on-task behavior and physical activity levels.

Risks of Participation
The only foreseeable risks associated with participating in this study are breach of confidentiality and injury due to physical activity. Measures will be taken to protect your child's confidentiality to the extent that it is possible. These are described in the "Confidentiality" paragraph below. All physical activity opporutnities provided as part of this study are developmentally appropriate and safe for participation.

Benefits of Participation
All participants will contribute to the knowledge base about how schools can help impove education and public health. This directly benefits your child as a student because his/her school can use this knowledge base to provide him/her with the best possible learning experiences.

Confidentiality of Records
All data will be securely stored at the Richland One School District Office or the Public Health Research Center at the University of South Carolina in a locked office. No one except the research team will have access to the data. If your child is observed, they will be assigned a number and only the number will be used in data entry and analysis. The results of this study may be presented at meetings or in publications; however, data will be reported in aggregate and your child's identity will not be disclosed.

Contact Persons
For more information concerning this research you should contact, Dr. Tony Boatwright, at (803) 231-6874 or email him at anthony.boatwright@richlandone.org .

If you have any questions about your rights as a research subject, you may contact: Thomas Coggins, Director. Office of Research Compliance, University of South Carolina, Columbia, SC 29208, Phone – (803) 777-4456, Fax – (803) 576-5589, E-Mail – tcoggins@mailbox.sc.edu.

Voluntary Participation
Participation in this study is voluntary. Participation is not connected with normal school and class activties/performance. Non-participation will not hurt your child's academic standing. You and/or your child are free not to participate or to withdraw at any time, for whatever reason. There is no penalty for not participating. In the event that you and/or your child do withdraw from this study, the information you and/or your child have already provided will be kept confidential.

Opt-Out information

If you do not want this information collected from your child, please indicate this to your child's classroom teacher. If your child does not want to participate in this evaluation, they simply need to indicate this to their classroom teacher. Should your child choose not to partcipate in the evaluation they will still be able to access the Kinesthitic Lab and/or Classroom just like their classmates.

Appendix E: Teacher Notification Letter

Study of an Integrative Training Model to Increase Children's School-Based Physical Activity

Collin A. Webster, Ph.D., Principal Investigator
Department of Physical Education and Athletic Training

Introduction
Researchers in the Departments of Physical Education and Athletic Training, Exercise Science, and Psychology at the University of South Carolina are conducting a study of physical activity promotion in elementary schools. The school district is neither sponsoring nor conducting this research. The results of this study will help to inform researchers, school professionals, and policy makers about how best to increase physical activity opporutnities for students during the school day.

The integrative training model used in this study will involve introducing elementary classroom and physical education teachers to evidence-based strategies for increasing children's physical activity during the school day. The training will be held during a regularly scheduled professional development workshop in January 2016 and will focus on strategies for increasing children's physical acitivity in general education classrooms and during physcial education lessons. Following the training, teachers will receive three booster sessions in February/March 2016, also scheduled during regular professional development workshops. The researchers will collect data on teachers' physical activity promotion and child physical activity before (October/November 2015) and after the training/booster sessions (April/May 2016). The researchers will also collect data on the teachers' perceptions of the training/booster sessions, and on implementing the strategies from the training/booster sessions, at the end of the semester (May 2016).

Some participating schools will initially receive the training/booster sessions while others will be given the opporutunity to receive the the training/booster sessions at a later date. However, an important part of the study is determining the status of physical activitiy promotion and current level of physical activity participation at all schools in the study. Classes in different grades were randomly selected and your class was one of the classes selected to participate in the study. You are being invited to participate in this study, in which we may ask you to participate in the trainings/booster sessions, use physical activity strategies from the trainings/booster sessions, be observed several times while you are teaching during the Spring 2016 academic semester, and participate in a survey and an interview about your experiences with the study. Please read this notification letter carefully so that you fully understand the study's purpose, procedures, risks, and expectations for participation. You are encouraged to ask the principal investigator, Dr.

Collin Webster, any questions that you may have before making a decision whether or not to participate. *As this form contains important information that may be needed for future reference, please retain a copy for your personal records*.

Purpose of Study
The purpose of this study is to examine the effectiveness of an integrative training model on increasing teachers' physical activity promotion and increasing children's school-based physical activity.

Description of Study Procedures

1) Classes in different grades at your school were randomly selected to partcipate in the study. All children in each of these classes and their teachers are elligible to participate in this study.

2) The research team team may provide you with our integrated training/booster sessions during the Spring 2016 academic semester. The training/booster sessions would take place during your regularly scheduled professional development workshops. The training/booster sessions focus on evidence-based strategies to increase children's physcial activity during the school day.

3) If your receive the training/booster sessions, you will be asked to implement the strategies during the Spring 2016 academic semester. None of the strategies should interrupt your students' academic learning time or result in decreased academic performance. Based on previous research, it is possible that the strategies may increase your students' classroom performance and academic achievement.

4) If you receive the training/booster sessions, members of the research team will observe you up to four times while you are teaching during the Spring 2016 academic semster. Observations will be as disruptive as possible; only one researcher will conduct each observation and will quietly sit in the back of your learning space (e.g., classroom, gym).

5) If you receive the training/booster sessions, you will be asked to complete a 15-minute survey and participate in a 45-minute interview about your experiences with the study and with school-based physical activity promotion in general. The None of the activities will interrupt academic learning time. The anticipated duration of the study is approximatley three academic years.

6) Children in your class may be asked to wear a motion sensor, attached at the hip, on days that observations are conducted. You may be asked to put on/take off the motion sensors with oral instructions from our research staff. The research team will take full responsibility for damaged or lost motion sensors during the course of the study.

7) The researchers will analyze data collected from the observations, survey, and interviews, and motion sensors.

Risks of Participation
The only foreseeable risk associated with participating in this study are breech of confidentiality. Measures will be taken to protect participatnt confidentiality to the extent that it is possible. These are described in the "Confidentiality" paragraph below.

Benefits of Participation
Through participation in the study, you may learn new strategies that enhance your teaching and your students' school performance.

Confidentiality of Records
All data will be securely stored at the Blatt Physical Education Center in a locked laboratory that only the research team has access to. Participants (schools, teachers, and students) will be assigned number identifiers and only the numbers will be used to data entry, analysis, and reporting purposes. The results of this research study may be presented at meetings or in publications; however, data will be reported in aggregate and your identity will not be disclosed.

Contact Persons
For more information concerning this research you should telephone the principal investigator, Dr. Collin Webster, at (803) 719-2266 or email him at websterc@mailbox.sc.edu.

If you have any questions about your rights as a research subject, you may contact: Thomas Coggins, Director. Office of Research Compliance, University of South Carolina, Columbia, SC 29208, Phone – (803) 777-4456, Fax – (803) 576-5589, E-Mail – tcoggins@gwm.sc.edu.

Voluntary Participation
Participation in this study is voluntary without negative consequences. You are free not to participate or to withdraw at any time, for whatever reason. There is no penalty for not participating. In the event that you do withdraw from this study, the information you have already provided will be kept confidential.

Appendix F: Fidelity Of Training To Recommended Best Practices Individual Interview Protocol

Purpose (for the researchers only)

The purpose of this interview is to determine the training's alignment with recommended best practices proposed by Hunzicker (2011).

Introduction (to be read to the participants)

The purpose of this interview is to determine the training's alignment with recommended best practices. You are encouraged to answer openly and honestly. During the interview, I will ask questions and open the floor for responses. I will also follow up with probes to investigate certain topics and/or questions in more detail. For transcription purposes, please state your name before responding. With your permission, I will record this interview for transcription purposes. Do I have everyone's permission to record this interview? Does anyone have any questions before we begin?

Questions:

1. What was the purpose of the training?
Prompt: What was the overall goal or objective of this training?

2. What activities and/or learning experiences were provided during the training?
Prompt: Describe what occurred during this training?

3. In what order did these activities take place?
Prompt: Describe the order of activities that took place.

4. How would you summarize the content provided during the training?
Prompt: What information was provided during the training?

Appendix G: Participants Perspectives Of Training Focus Group Protocol

Purpose (for the researchers only)

This interview will focus on the teacher's experiences participating in the kinesthetic and activity lab training. Questions will primarily focus on determine participating teachers' perceived strengths, and/or weaknesses of the training. This interview will also explore teacher perceptions/suggestions as to how the training could be improved.

Introduction (to be read to the participants)

The purpose of the interview is to discuss your perceptions and experiences with respect to the kinesthetic and activity lab training at the beginning of the year. You are encouraged to answer openly and honestly. During this interview, I will ask question and open the floor for responses. I will also introduce probes to investigate certain topics and/or questions in more detail. For transcription purposes, please state your name before responding. With your permission, I will record this interview for transcription purposes. Do I have everyone's permission to record this interview?

Does anyone have any questions before we begin?

Questions:

1. What were your perceptions of the strengths of the kinesthetic and activity lab training? **Prompt**: What did you like about the training?

2. What were your perceptions the limitations of the kinesthetic and activity lab training?
   Prompt: What did you dislike about the training?

3. Did you perceive the training to be beneficial in promoting your effective use of the kinesthetic and activity lab? Why or why not?
   Prompt: Do you believe this training improved your abilities to use the kinesthetic and action based labs?

4. What are some ways the kinesthetic and activity lab training could be improved?
   Prompt: Any suggestion in ways this training could be improved?

5. If a neighboring school were to implement a kinesthetic and activity lab, would you recommend this training? Why or why not?

Prompt: Would you recommend this training to others schools thinking of implementing a kinesthetic or action based learning lab?