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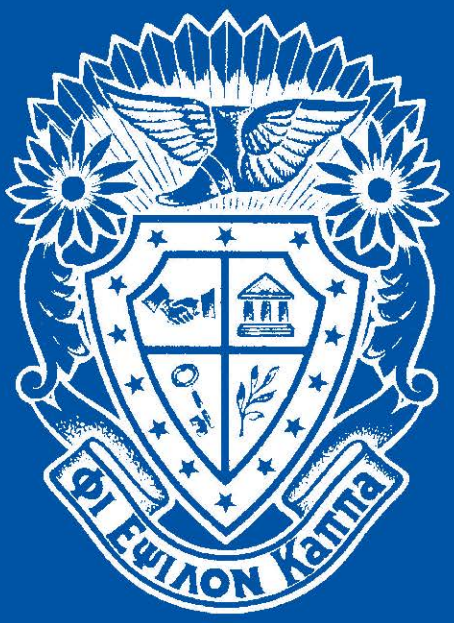

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MOTOR PERFORMANCE

Exploring the Effect of Gender and Disability on Gross Motor Performance in Kindergarten Children

Andrew M. Colombo-Dougovito

Abstract

Background: *Gross motor movement is a vital part of the growing process and ultimately plays a role in a person's ability to lead a physically active life. Researchers have analyzed the different ways in which individuals develop skills. At the heart of that discussion has been gender. Most recently, researchers have focused on the differences among various forms of disability. However, little has been done to understand how these variables interact with each other in the development of gross motor skills.* ***Objective:*** *Therefore, in this study I sought to explore the interaction of disability and gender on gross motor performance.* ***Method:*** *Utilizing a national dataset, the Early Childhood Longitudinal Study - Kindergarten Class of 1998–99 dataset (ECLS-K), I utilized a 2 × 2 factorial ANOVA to understand the effects of gender and disability on gross motor score.* ***Results:*** *A large sample (N = 16,960) was utilized to indicate a significant interaction effect of gender and disability, as well as significant main effects. Results suggest that both gender and disability have an effect on gross motor performance; specifically, boys with disabilities are at a higher risk for having low gross motor skills.* ***Conclusion:*** *The significant re-*

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sults from this analysis demonstrate that gender and disability have an effect on the gross motor ability of young children. In contrast to other literature, in this study female participants performed slightly better than male participants did, and in line with other research, in this research the group without disabilities demonstrated a better gross motor score than the group with disabilities.

Gross motor movement stems from large muscle groups and whole body movement and is essential for all locomotor movement such as walking and running and for object-control movements such as throwing and kicking. These skills are typically attained and developed through early childhood and mastered as children age into adolescence (Davies & Rose, 2000). Gross motor movement is essential for daily functioning and for physical activity. Without proper development of these large muscle movements, future advancement to more complex motor movements or development of motor competence is difficult. Individuals with a limited or lower motor competence have been shown to have lower fitness levels when compared with individuals with an average motor competence (Fransen et al., 2014; Stodden et al., 2008). Early development of gross motor skills is vital to increasing the likelihood of continued physical activity.

Understanding individual difference in development is the best way to understand how to improve the development of skills. Motor deficits among various populations with disabilities are apparent with the research literature, when these individuals are compared with their peers without disabilities. In recent research, children with autism spectrum disorder (ASD) have shown significant delays in motor skill performance when compared to typical peers (Liu, Hamilton, Davis, & ElGarhy, 2014), as tested with the Test of Gross Motor Development (TGMD-2; Ulrich, 2000). Additionally, individuals with mild intellectual disabilities (ID) have been shown to perform poorly on fitness measures (muscular strength, muscular endurance) when compared with peers without ID (Frey & Chow, 2006). Limited muscular strength and endurance needed for gross motor activities can lead to a limitation of gross motor movements and therefore is concerning for the future possibility of lifetime physical activity. Furthermore, gross motor issues have been documented even in children with learning disabilities who have demonstrated similar development patterns, although behind their typical peers

(Westendorp et al., 2014). Outside of cognitive and developmental disabilities, children who are blind have shown lower locomotor ability and object control skills when compared to their sighted peers (Wagner, Haibach, & Lieberman, 2013). With individual evidence of the deficits of groups with disabilities, it is necessary to look broader to gain a better understanding of how individuals with disabilities vary from those without disabilities.

On the other hand, gender differences among boys and girls have not been as clearly defined. The recent literature has demonstrated differences between genders in locomotor and object control skills (Butterfield, Angell, & Mason, 2012; Crespo et al., 2013; Venetsanou & Kambas, 2011), as well as limited or no differences in locomotor skills (Goodway, Robinson, & Crowe, 2010). Early development of motor ability is dependent on the interaction between environmental and biological factors (Saraiva, Rodrigues, Cordovil, & Barreiros, 2013; Thomas & French, 1985; Valentini, Clark, & Whitall, 2015). Barnett, van Beurden, Morgan, Brooks, and Beard (2010) demonstrated that boys performed better on object control skills than did similarly aged girls. This was further evidenced in a study of 3–6-year-old children in which boys performed better in throwing for distance (du Toit & Pienaar, 2002). Du Toit and Pienaar (2002), in the same study, conversely demonstrated that girls performed better in hopping and balance on one leg. Furthermore, Kakebeeke, Caflisch, Locatelli, Rousson, and Jenni (2012) demonstrated girls performed higher than boys on a majority of balance-type gross motor tasks such as standing on one leg, walking on a beam, hopping on one leg, rising, running, and jumping up and down. Gender differences are evident across a magnitude of motor skills; however, there appears to be a trend that girls perform better on locomotor-type skills and boys on object control skills (Goodway et al., 2010; Lorson, Stodden, Langendorfer, & Goodway, 2013).

Few researchers have looked at how the interaction of gender and disability affect gross motor performance. Evidence suggests how the individual variables may affect gross motor performance; however, it is not clear how they work together. Therefore, the aim of this study was to explore the relationship of gender and disability on gross motor performance, in order to understand (1) How do gender and disability affect gross motor performance? and (2) If an interaction effect is occurring, which variable is accounting for the effect?

Method

Dataset

A sample from the Early Childhood Longitudinal Study - Kindergarten Class of 1998–99 dataset (ECLS-K; U.S. Department of Education, National Center for Education Statistics, 2001) was utilized in this analysis. This dataset provides a substantial amount of information on the children's status at entry to school, their transition into school, and their progress through eighth grade. The ECLS-K recruited children from public and private schools and from diverse socioeconomic and racial/ethnic backgrounds. Information was recorded on information from reading and math skills, to social/emotional skills, to fine and gross motor skills. Trained evaluators assessed children in their schools and collected information from parents over the telephone. Teachers and school administrators were contacted in their schools and asked to complete questionnaires. (Rock & Pollack, 2002). The original dataset contained over 18,000 variables and around 22,000 child participants (Rock & Pollack, 2002).

For this study, three variables were chosen for analysis: gender, disability, and gross motor score. A sample of 16,960 cases was used in this analysis. The sample included 58% White, 14.7% Black/African American, 17.5% Hispanic, 4.2% Asian, 1.7% American Indian or Alaskan Native, and 2.8% identifying as more than one race. Data were taken at the initial entry into school.

Independent Variables

Two grouping variables, gender and disability, were used to break the sample into comparable groups. Each variable contained two levels. Gender was labeled as male (n = 8620) or female (n = 8340), roughly 50.8% and 49.2% of the sample, respectively. The disability group was designated as "yes" a disability is present (n = 2299) or "no" the child has no disability (n = 14,661), for 13.6% and 86.4% of the sample, respectively. In the case of the disability variable, project staff asked schools whether the child had an individual education plan (IEP), an individualized family service plan (IFSP), or a 504 plan; once children were identified as receiving special education assistance due to disability, project staff identified what accommoda-

tions were needed to be made to administer the direct child assessment batteries appropriately (Rock & Pollack, 2002). Considering the difference in sample size between the group with a disability and the group without, and considering the U.S. population as a whole, this sample is fairly representative of what would be expected. In this dataset, disability is a very dichotomous simplification of a heterogeneous group; however, the use of this variable allows for a global understanding of the differences of those with and without disabilities. Additionally, this was the only indication of this population within the dataset. The original collectors of this data did not go into depth into what specific disabilities the included children had. The sample for this study was limited to cases in which both independent variables were known; data were considered missing completely at random, as data was being analyzed secondarily, and missing data were independent of observed variables.

Dependent Variable

The gross motor score of participants was utilized as the dependent variable. The gross motor score is a summative score of a multitude of tests taken from outside assessments and utilized in aggregate for the dataset; assessment items combine jumping, balancing, hopping, skipping, walking backward, and a bean bag catch. Maximum scores for individual tests were between 1 and 2. Total scores ranged from a minimum of 0 to a maximum of 8 (see Tables 1 and 2). Only an aggregated gross motor score was included in the dataset; individual assessment items scores were not included. Individual testing items were taken from a multitude of assessment batteries; these focused predominantly on body control and coordination (e.g., balancing on one foot, hopping on each foot, skipping, and walking backward on a line; West, Dento, & Germino-Hausken, 2000).

Table 1
Descriptive Statistics of Gender

Gender	*n*	Gross motor *M*	Gross motor *SD*	Kurtosis	Skewness
Male	8620	6.13	1.918	0.461	-1.016
Female	8340	6.64	1.645	1.116	-1.247
Total	16960	6.385	1.782		

Table 2
Descriptive Statistics of Disability

Disability category	*n*	Gross motor *M*	Gross motor *SD*	Kurtosis	Skewness
Yes	2299	5.97	2.014	0.131	-0.901
No	14661	6.45	1.764	0.932	-1.177
Total	16960	6.21	1.889		

Data Analysis

The relationship of gender and disability on gross motor score was explored utilizing a two-way factorial ANOVA to analyze the interaction. The factorial ANOVA tested for any differences of between-subject effects of gender, disability, and the interaction of gender and disability. Prior to analysis, data were analyzed for univariate outliers through analysis of the histograms, skewness, and kurtosis as well as the standardized values ($M < 3.29$) within groups. No outliers were identified; therefore, all 16,960 cases were used in the analysis.

Results

Descriptive analysis revealed female participants both with and without disabilities ($M = 6.64$, $SD = 1.645$) scored slightly higher than male participants ($M = 6.13$, $SD = 1.918$; see Figure 1). Similarly, the group without disabilities (M = 6.45, SD = 1.764) demonstrated a higher mean gross motor performance, than the group with disabilities (M = 5.97, SD = 2.014) (See Figure 1). Each of the groups demonstrated scores very close to the maximum possible of 8, demonstrating a potential ceiling effect.

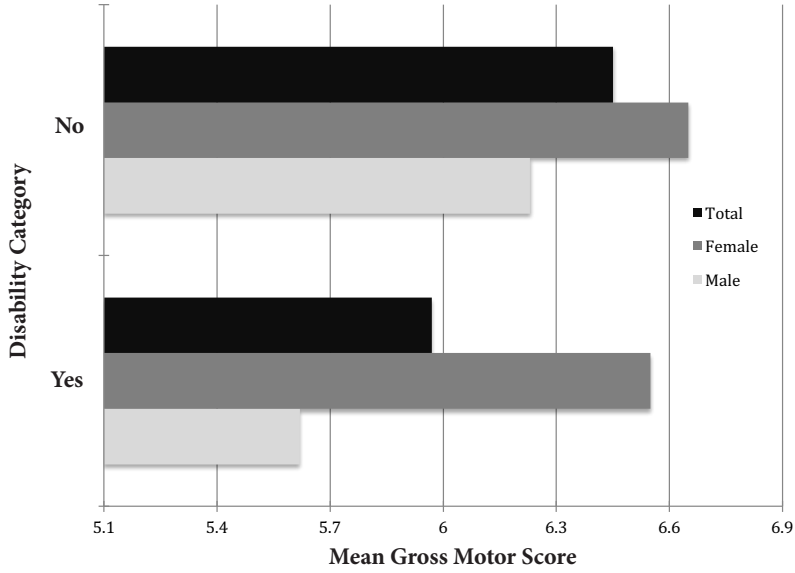

Figure 1. Difference within gender and disability.

The factorial ANOVA resulted in a significant result within the interaction between gender and disability on gross motor score, $F(1, 16956) = 39.424$, $p < 0.001$, $\eta^2 = 0.002$, demonstrating a significant interaction effect of both gender and disability on gross motor ability. Furthermore, significant results were shown in the main effects between the gender groups, $F(1, 16956) = 272.895$, $p < 0.001$, $\eta^2 = 0.016$, and between the disabilities groups, $F(1, 16956) = 75.672$, $p < 0.001$, $\eta^2 = 0.004$, further showing a significant difference between each of the levels of both gender and disability. However, each of the eta-squared effect sizes reveals that gender and disability account for a very small amount of the variance.

Further, the effect sizes of the main and simple effects were measured with the guidelines outlined by Cohen (1977), and each group demonstrated a small effect. Main effects between the female and male group (ES = 0.285) and the group without disability and with disability (ES = 0.254) were small, demonstrating about a quarter standard deviation difference between the groups. The simple effect analysis of the female group without disabilities and the male group without disabilities revealed a small effect size (ES = 0.262). A moderate effect size (ES = 0.492) was shown in the difference of the

female group with disabilities and the male group with disabilities, demonstrating a relatively large difference between girls and boys with disabilities.

Discussion

In this study, I sought to explore the relationship of the interaction between gender and disability on gross motor score. A factorial ANOVA demonstrated significant although very small main effects and a significant interaction effect. Results indicate that gender and disability play a role in the differences revealed in this analysis. Through this analysis, it can be suggested that both gender and disability have a factor in how a child develops motor skills. This result in itself is not surprising or overtly contrary to the commonly held beliefs that (1) boys and girls perform skills differently and (2) individuals with disabilities would have gross motor scores less than those of their peers without disabilities, but it does provide sufficient foundational evidence to warrant an inquiry into which gross motor skills are hindered because of the disability.

Moreover, these results provide contrary evidence to the previous research on gender, but more important provide a unique look at a young, large sample of boys and girls with and without disabilities. Results from this study suggest that gender and disability have some type of mitigating effect on the development of gross motor skills, but the exact effect within this analysis is difficult to ascertain. Furthermore, in this analysis the small effect sizes for the ANOVA suggest that other factors (e.g., age, race, or socioeconomic status) may explain the differences, as gender and disability account for less than 2% of the results. Previous research (Saraiva et al., 2013; Thomas & French, 1985; Valentini et al., 2015) has suggested that the differences in gender groups are caused by an interaction of social and biological factors, which often favor boys (Crespo et al., 2013). However, results from this analysis are taken from a sample of prepubescent children, so biological factors should be limited.

In a recent analysis of parent and child perceptions of fundamental movement skills, Liong, Ridgers, and Barnett (2015) found that parents' perceptions of girls' locomotor skills were significantly and positively associated with girls' actual locomotor scores ($r = .48$). Parents had similar perceptions with boys' scores for object control skills ($r = .58$). Evidence from this study suggests that par-

ents' judgment of skills indicates some level of stereotyping (Liong et al., 2015). Perhaps differences seen in young children are a factor of what children are expected to do, as well as encouraged to do. If young boys are encouraged to perform more stereotypical activities such as soccer and baseball, then they will likely be more proficient in the fundamental motor tasks associated with those skills. If girls are encouraged to participate in activities such as jump roping and hopscotch, then they will likely have a higher affinity to activities using balance and locomotion. These differences are evident within these results, as well as in previous research (Barnett et al., 2010; du Toit & Pienaar, 2002; Kakebeeke et al., 2012), as the motor assessment battery chosen for this assessment contained a majority locomotor and balance–type skills, with one singular object control task (catching a tossed bean bag). Within the assessment battery there were no other throwing or object control items, which, based on previous research, would favor boys. A lack of object control activities in the assessment likely attributed to the girls having a greater mean score regardless of disability. It also does not completely capture the skills necessary to be proficient in all gross motor movement.

Considering the differences shown between the group with and without disabilities, the results in this analysis are, again, what would be expected. This analysis allows for global understanding of the differences between those with and without disabilities; however, the effect of the disability is difficult to understand fully because all children labeled "with a disability" were included in this group based on the presence of an IEP. An IEP is not a detailed enough record when trying to understand why there are differences between these groups. Children with an IEP have this for a multitude of reasons, which stem from physical, cognitive, or behavioral disabilities, all of which have drastically different effects on the their ability to learn and utilize knowledge. The database used for this study, by defining disability based on the presence of an IEP, may indicate the presence of limited opportunity, as with stereotyping between gender groups. The pressures to provide services within the IEP process and for schools to prioritize services (Whitby, Marx, McIntire, & Wienke, 2013) may lead to some children being given certain services (e.g., speech) over others (e.g., adapted physical education [APE] or occupational therapy [OT]). When schools prioritize and place more

emphasis on certain services, the child may have a limited opportunity to learn motor skills. Further, there may be a misunderstanding of the items taught in OT versus APE, with a belief that services are similar and therefore both are not needed. Research has demonstrated that deficits exist among children with disabilities in regard to motor ability; therefore, what may be evidenced in this result is that although biological factors may exist, perhaps it is also a limited accessibility (e.g., environmental factor) to learn tasks that is causing a difference.

There were simple effects with each group, and again, in this study girls outperformed boys in both groups regardless of having or not having a disability. However, what is prevalent is how much better the girls with disabilities performed than the boys with disabilities. The girls' mean gross motor score was nearly one half a standard deviation (ES = 0.492) higher than the boys', indicating that not only is the presence of a disability having an effect on the motor ability of children, but gender is also having an effect. Results indicate that boys with disabilities are at a higher risk for having lower motor skills. It is difficult to discern whether the lower motor tasks are due to the type of assessment used or the type of disability. It can be discerned, however, that boys with disabilities are at risk; therefore, educators should be aware that this could occur and provide ample opportunity for practice so that these boys can reach the level of their peers.

Considering the practical application of these results, it is important to understand that although there are specific differences among boys and girls with and without disabilities, boys with disabilities performed lower than any other group. Further, children with disabilities demonstrated lower scores than did those without disabilities. The differences, however, are only accounted by a small amount from gender and disability, especially in young children. These differences may be further affected by variables not accounted for in this analysis. The race, age, or socioeconomic status of individuals may account for a greater amount of difference than gender or disability. Similar to Liong et al.'s (2015) results, these results indicate that parents and teachers should advocate and encourage the growth of all skills necessary for gross motor movement and provide opportunities for practice and development, especially for those with dis-

abilities. Moreover, teachers and parents can ensure that they focus on all skills sets, as the development of gross motor tasks allows for children to progress to the more complex movement needed to lead physically active lives. Future research should analyze the specific differences in gross motor skills of those with disabilities, to understand better what skills are hindered more by the disability.

Limitations

The data included in this study were a selected sample from a much larger dataset and therefore outside of my control. Two practical issues limit the application of these results. The first is that limitation is the restricted factor of the disability category. The data provide a global look at the effect of disability, but they do not provide specific detail to understand individual differences in children. When the data were collected, no specific diagnosis was collected, which could encompass a variety of diagnoses. In the future, researchers should collect a variety of diagnoses to allow for a deeper analysis.

The second limitation was the gross motor assessment utilized. First, the assessment items were collected from a variety of other validated assessments and not validated on their own merit. Future research in which data are collected should include a validated assessment battery to ensure that the construct is covered by the associated test. This would ensure that the scores collected are a fair representation of the participants' gross motor ability. Additionally, the only data included were the aggregated gross motor composite scores. Including the scores for each item would allow for a deeper analysis of locomotor and object control skills. Although the scores demonstrated a significant result, the result provided little practical application because it did not allow for an in-depth analysis. Moreover, the variety of gross motor items were a collection from a variety of other gross motor assessments and may have favored the girls in this analysis because of the lack of object control–type skills. To gain a better understanding of how gross motor skills develop and to find how those skills appear in different groups, researchers should use large datasets that include a validated measure. By doing so, they will have the potential to understand how motor skills relate to other skills such as academics.

Conclusion

The significant results from this analysis demonstrate that gender and disability have an effect on the gross motor ability of young children. Contrary to other literature, female participants performed slightly better than did male participants, and in line with other research, the group without disabilities demonstrated a better gross motor score than the group with disabilities. However, the grouping factors only accounted for a small amount of the variance between each group. Researchers should include other factors that may play a more vital role in the differences between these groups. Additionally, future research should include the individual testing items to allow for the ability to analyze which gross motor skills are having the greatest effect as a result of gender or disability. However, these results suggest that educators and parents can work to alleviate some of this difference by providing equal opportunities to practice all types of skills involved in gross motor movement. Further review of this interaction is needed, with a more sensitive gross motor measurement, as well as including diagnosis of each participant.

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MOTOR SKILLS

Effects of an Educational Gymnastics Course on the Motor Skills and Health-Related Fitness Components of PETE Students

Liana Webster

Abstract

Many physical education teacher education (PETE) programs seek to develop teacher candidates' content knowledge through various physical activity courses. However, limited empirical evidence exists linking college physical activity courses to the development of skill or fitness. The purpose of the study was to examine the effects of an educational gymnastics course on PETE students' motor skill proficiency and health-related fitness components. Participants (N = 22) were PETE students enrolled in an educational gymnastics course. Data were collected from two primary sources: (1) four individual skills tests and the South Carolina Physical Education Assessment Program (SCPEAP) Elementary School Educational Gymnastics assessments and (2) the FitnessGram test battery. Findings suggest that an educational gymnastics course can improve PETE students' content knowledge/motor skill proficiency. Additionally, a relationship may exist between certain fitness indicators and motor skill level in educational gymnastics. This study may guide PETE programs in making decisions regarding the inclusion of educational gymnastics as a content course in their programs, as such a course may help ensure that teacher candidates are physically educated individuals who are able to demonstrate competent movement performance.

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Standard 2 of the National Initial Physical Education Teacher Education Standards indicates that physical education teacher candidates are physically educated individuals with the knowledge and skills necessary to demonstrate competent movement performance and health-enhancing fitness (National Association for Sport and Physical Education [NASPE], 2008). Competence in motor skills is important to being an effective physical education teacher (Capel & Whitehead, 2015; Martens, Burwitz, & Zuckerman, 1976; Mitchell, 2007; NASPE, 2009; Staffo & Stier, 2000), because the teacher must be able to demonstrate properly for students to imitate good practice and become more proficient (Capel & Whitehead, 2015). Being personally fit is also important to being an effective physical education teacher (Cardinal, 2001; Gold, Petrella, Angel, Ennis, & Woolley, 2012; Kamla, Snyder, Tanner, & Wash, 2012; Melville & Maddalozzo, 1988; Mitchell, 2007; NASPE, 2009), because PE teachers who model a lifestyle that promotes fitness and physical activity are better able to reinforce student learning about fitness concepts and will influence their students to adopt similar lifestyles (Kamla et al., 2012).

One way that physical education teacher education (PETE) programs ensure that their majors are skillful in a variety of movement forms is by building their content knowledge via physical activity courses designed for PETE students (Ayvazo, Ward, & Stuhr, 2010). However, there is much variability in both the amount and types of content courses provided by PETE programs in colleges and universities in the United States (Bahneman & McGrath, 2004), with many programs seriously reducing the credit hours available for these courses (Siedentop, 2002). This variability is due to the long-standing issue of determining exactly what should represent the essential movement content core for PETE programs (Collier, 2006) and has been compounded by the issue of curricular space in these programs (Ayers & Housner, 2008).

Educational gymnastics is one content area commonly included in PETE programs. It is an activity with many benefits (Baumgarten & Pagnano-Richardson, 2010; Bean, 1977; Beaumont, 1979; Capel, 1986; Donham-Foutch, 2007; Hardy, 1978; Mauldon & Layson, 1979; Sloan, 2007; Werner, Williams, & Hall, 2012; Williams, 1987), and it has been described as a fundamental and critical part of the physical education curriculum that should be offered in preschool

through college (Donham-Foutch, 2007). One such benefit is that it promotes abilities related to health and fitness (Werner et al., 2012; Baumgarten & Pagnano-Richardson, 2010). Educational gymnastics is unique from other content areas in that it plays a role in sports and everyday life by helping people learn how to manage their bodies efficiently and safely (Werner et al., 2012). It is also unique in that an indirect teaching style and open-ended tasks are used, making it a developmentally appropriate activity that allows for differences in individual skill levels so that all participants can be successful at a task (Nilges, 2002).

The arguments in favor of educational gymnastics as an essential content area are plentiful, but limited empirical evidence exists linking physical activity courses to the development of content knowledge in the form of motor skill proficiency or fitness outcomes in PETE students. Few researchers have examined the relationship between educational gymnastics specifically and the development of skill and/or fitness. There is an emerging relationship between skill and fitness (Barnett, Beurden, Morgan, Brooks, & Beard, 2008; Stodden, Langendorfer, Goodway, Ferkel, & Gao, 2012; Stodden, Langendorfer, & Robertson, 2009; Webster et al., 2014), but the majority of studies in this area have been conducted on youth as opposed to college students. Furthermore, most researchers have not used gymnastics as a measure of skill. Perhaps the most relevant of these studies, Webster et al.'s (2014) study included an examination of the relationship between teacher fitness and movement competence in a series of gymnastics skills based on the role of motor competence in performing effective demonstrations of movement skills to learners (Webster et al., 2014). However, Webster et al. did not exclusively examine PETE students and included other education majors in their study.

The purpose of this study was to examine the effects of an educational gymnastics course on PETE students' motor skills and health-related fitness components. The three research questions driving this study were as follows: (1) Does instruction in an educational gymnastics course improve the motor skill levels of PETE students on selected educational gymnastics tasks? (2) Does participation in an educational gymnastics course improve the health-related fitness of PETE students? (3) Does a relationship exist between PETE stu-

dents' fitness and motor skill levels across the stages of content development in educational gymnastics?

Method

Participants and Setting

Participants (N = 22) were PETE students enrolled in a mixed undergraduate–graduate educational gymnastics course during the Fall 2013 (n = 10) and Spring 2014 (n = 12) semesters at a large university in the Southeastern United States. Participants included 19 undergraduates ranging in age from 19 to 28 years old (M = 21.9) and three master's students ranging in age from 22 to 23 years old (M = 22.3). The mean age of all participants combined was 22.0 years. Nine participants were female and 13 were male. The researcher was the instructor of the course. The educational gymnastics class met approximately three times per week for a total of 41 class meetings over the course of each semester. Each class was 50 min in length. All class meetings occurred in an average-sized indoor gymnasium. All data collection for the study occurred during the scheduled class meeting times.

Instrumentation

Motor skills. Motor skills were measured using the South Carolina Physical Education Assessment Program (SCPEAP) for Elementary School Educational Gymnastics (second and fifth grades) and four individual skills tests. The SCPEAP was originally formed to provide the South Carolina Department of Education with a valid and reliable assessment of physical education programs. SCPEAP materials were continually piloted and revised before their inclusion in the program and continually revised with teacher experience over more than 10 years (SCPEAP, 2010). The elementary school assessments were selected for this study because they most closely aligned with the content taught in the educational gymnastics course. Having each taught the educational gymnastics course in the past and used SCPEAP or similar assessments with university-level students, the researcher and one other expert in educational gymnastics determined this instrument to be valid with this population. The motor skills tests were divided into three stages. Stage 1 consisted of four individual skills. Stage 2 followed the SCPEAP second grade

test protocol involving a combination of skills. Stage 3 followed the SCPEAP fifth grade test protocol involving a sequence of skills.

A test of individual skills (Stage 1) was included to match the skill progression taught in the educational gymnastics class, which is practicing individual skills, followed by combining skills, and finally sequencing (Nilges, 1997). The test of individual skills was created by the researcher and one other educational gymnastics expert. Four basic skills were selected to represent each of the four foundational skills of educational gymnastics: rolling actions, balancing actions, step-like actions, and flight actions. A forward roll, a cartwheel, a still shape standing on one foot with arms out to the sides, and a tuck jump off of a block mat were selected, respectively. Each of the individual skills had three cues associated with quality performance.

For the combination of skills (second grade SCPEAP protocol), participants create, write, and perform a balance (a shape held still), a roll, and a different balance. Balances are to show at least two of the following changes: base of support, level, and shape. Participants are assessed on the clear shapes at the beginning and the end of the combinations and their ability to hold these shapes still for 3 s each. They are also assessed on how they perform the roll and the transitions (smoothness) getting into and out of the roll (SCPEAP, 2007).

For the sequence of skills (fifth grade SCPEAP protocol), participants create, write, and perform a gymnastics sequence including a beginning balance and different ending balance and four different movement elements. Movement elements include the following: mount, travel along, and dismount apparatus; turn or change of direction; change in speed; upright or inverted balance showing clear shapes and extensions held for 3 s; aerial movement shape in flight; a skill requiring some support on hands; and rolling. Participants are assessed on having a clear beginning and ending balance (held for at least 3 s with a clear body shape), demonstration of at least four movement elements with good technique, continuity/smooth transitions (one action logically linked to another with no extra steps), controlled use of momentum and balance, and the written narrative matching the performance (SCPEAP, 2007).

Rubrics were used to score participants on their ability to perform each of the six motor skills tests (four individual skills, a combination of skills, and a sequence of skills) at pre- and posttest. Each

rubric had four levels, with Level 3 as the highest possible score and Level 0 as the lowest. For the combination of skills, the better of the two performances was scored (SCPEAP, 2007). Interrater reliability was established between the researcher and the same expert who assisted in creating the individual skills tests.

A pilot study was used prior to this study to establish the stability of the motor skills assessments. Eleven undergraduate PETE students enrolled in the educational gymnastics course the semester before the study began served as participants. Participants were pretested one week and posttested the next week following the protocol described in the Procedures section (in the actual study, a full semester of educational gymnastics instruction occurred between pre- and posttest). The pilot study demonstrated that participants' scores on motor skills tests generally do not improve from pre- to posttest. This suggests that the motor skills assessments were stable and that participants' scores did not improve as a result of taking the test a second time. The pilot study also further validated the use of the SCPEAP for Elementary School Educational Gymnastics assessment with university-level students.

Fitness. Health-related fitness was assessed using established FitnessGram protocol (Meredith & Welk, 2010). The reliability and validity of the FitnessGram assessments are thoroughly documented in the *FitnessGram Reference Guide* (Plowman & Meredith, 2013). The specific FitnessGram test items used in this study were the PACER test for cardiovascular fitness, the 90° Push-Up and Curl-Up tests for muscular strength and endurance, the Back-Saver Sit and Reach test for flexibility, and the handheld bioelectrical impedance analyzer device for body composition.

Physical activity recalls. To account for participation in any outside activities that could affect health-related fitness or motor skills, PETE students completed physical activity recalls using the International Physical Activity Questionnaire (IPAQ) short version and responded to several additional questions. The IPAQ asks participants to provide information regarding the time that they spent being physically active in the last 7 days, focusing on the areas of vigorous physical activity, moderate physical activity, walking, and sitting. The reliability and validity of the IPAQ have been well established (IPAQ, 2002). Because the types of physical activities

performed were also of interest in this study, additional questions regarding time spent in cardiorespiratory, flexibility, and muscular strength/endurance activities were included as part of the physical activity recall process.

Procedures

Approval to conduct this study was obtained from the university's institutional review board prior to data collection. A pretest–posttest design was used. Motor skills testing and fitness testing took place at baseline and again at the end of the semester. Physical activity recalls were completed every 2 weeks, for a total of eight recalls per participant. The researcher provided instructions and demonstrations on testing days. All testing was video recorded for later analysis. Trained assistants aided the researcher in video recording and monitoring participants during testing.

Motor skills testing. Enough mats for all participants to have their own were arranged in the gymnasium. Four video cameras on tripods were set at a wide angle to capture the participants' performances from the side. Each participant additionally had one block mat approximately 12 in. high to be used for the Stage 1 flight action skill. Participants were given worksheets for motor skills testing at baseline. For Stage 1, participants had 1 min to practice each skill, followed by performing each skill once on camera. For Stage 2, they had 5 min to plan and practice their combinations of skills using their worksheets. They then performed twice on camera, per SCPEAP protocol. Participants had 10 min to plan and practice their Stage 3 sequence using their worksheets. They performed their sequence once on camera, per SCPEAP protocol. Worksheets were collected at the end of the testing day. Participants performed the same combination and sequence on the test at the end of the semester as they did at baseline.

Fitness testing. The five fitness test stations were set up in separate areas of the gymnasium on fitness testing days. Participants completed each of the five tests as a class, with all participants finishing one test before moving on to the next. Participants recorded their own scores on a scoresheet immediately after each test was completed. Scoresheets were collected at the end of each testing day. The videos were later reviewed to check participants' self-recorded fitness test scores for accuracy.

Treatment verification. The researcher kept detailed records of all lessons taught during each semester, including specific tasks within lessons. Additionally, four lessons were videotaped each semester and analyzed using the Basic Academic Learning Time - Physical Education (B-ALT-PE) instrument, with attention to how much time was spent in activity and instruction on those days. This treatment verification confirmed that the nature of the course was consistent with educational gymnastics and that students had consistent opportunities within the class to develop skill.

Data Analysis

Motor skills. The pre- and posttest scores on each motor skills assessment (four individual skills, a combination of skills, and a sequence of skills) were analyzed in separate related-samples Wilcoxon signed-rank nonparametric tests to determine if there was any improvement in educational gymnastics skills (Research Question 1).

Fitness. Pre- and posttest scores on each of the five fitness test items (PACER, Body Composition, Curl-Up, 90° Push-Up, and Back-Saver Sit and Reach) were analyzed using separate repeated-measures within-subjects analysis of variance (ANOVA) tests to determine if there were any improvements in fitness (Research Question 2). Fitness test scores were also analyzed descriptively to determine if they fell within the FitnessGram Healthy Fitness Zone ranges at pre- and posttest. A Spearman's rho correlation coefficient was used to analyze if any relationships existed between motor skill level and fitness (Research Question 3).

Physical activity recalls. Descriptive methods were used to analyze the types of activities in which students participated outside of the educational gymnastics class (cardiovascular endurance, flexibility, and muscular strength/muscular endurance) as well as the intensity of the activities (moderate and vigorous). Time spent in moderate to vigorous physical activities (MVPA) and fitness posttest scores were compared using a Spearman's rho correlation coefficient.

Results

Motor Skills

The related-samples Wilcoxon signed-rank tests revealed that participants' ability to perform each of the six selected educational

gymnastics tasks improved significantly from pre- to posttest. There was a significant increase in scores on the rolling action ($p = .02$), the balancing action ($p = .004$), the step-like action ($p = .003$), the flight action ($p = .001$), the combination of skills ($p < .001$), and the sequence of skills ($p < .001$) from pre- to posttest. The motor skills test results are presented in Table 1.

Fitness

The separate repeated-measures within-subjects ANOVA tests revealed a significant improvement in scores on the Curl-Up test ($p < .001$) and Body Composition test ($p = .001$) from pre- to posttest. No significant differences were found between pre- and posttest scores on the 90° Push-Up test ($p = .448$) or the Back-Saver Sit and Reach test ($p = .148$). There appeared to be a significant decrease in scores on the PACER from pre- to posttest ($p = .033$). Fitness test results are presented in Table 2.

One participant's PACER test scores met HFZ at pre- and posttest, and 21 participants' PACER test scores did not meet HFZ at pre- or posttest. For the 90° Push-Up test, 12 participants' scores met HFZ at pre- and posttest, five did not meet HFZ at pre- or posttest, four did not meet HFZ at pretest but met HFZ at posttest, and one met HFZ at pretest but not at posttest. On the Curl-Up test, 19 participants' scores met HFZ at pre- and posttest, one did not meet HFZ at pre- or posttest, and two did not meet HFZ at pretest but met HFZ at posttest. For the Back-Saver Sit and Reach test, 20 participants' scores met HFZ at pre- and posttest, one did not meet HFZ at pre- or posttest, and one did not meet HFZ at pretest but met HFZ at posttest. Nineteen participants' Body Composition test readings met HFZ at pre- and posttest, and three participants' readings did not meet HFZ at pre- or posttest. A summary of whether the participants met or did not meet the HFZ ranges at pre- and posttest is provided in Table 3.

Table 1
Motor Skills Test Results

Stage/motor skill	Level	Pretest frequency	Pretest %	Posttest frequency	Posttest %	χ^2	Asymptotic sig. (2-sided test)
Stage 1, Part 1: Rolling Action	0	0	0	0	0	21.0	.020
	1	1	4.5	0	0		
	2	5	22.7	0	0		
	3	16	72.7	22	100.0		
Stage 1, Part 2: Balancing Action	0	0	0	0	0	71.5	.004
	1	1	4.5	0	0		
	2	17	77.3	9	40.9		
	3	4	18.2	13	59.1		
Stage 1, Part 3: Step-Like Action	0	2	9.1	0	0	55.0	.003
	1	2	9.1	1	4.5		
	2	9	40.9	5	22.7		
	3	9	40.9	16	72.7		
Stage 1, Part 4: Flight Action	0	0	0	0	0	97.5	.001
	1	4	18.2	1	4.5		
	2	15	68.2	9	40.9		
	3	3	13.6	12	54.5		
Stage 2: Combination	0	17	77.3	0	0	190.0	< .001
	1	5	22.7	7	31.8		
	2	0	0	7	31.8		
	3	0	0	8	36.4		
Stage 3: Sequence	0	18	81.8	0	0	253.0	< .001
	1	4	18.2	2	9.1		
	2	0	0	14	63.6		
	3	0	0	6	27.3		

Table 2
Fitness Test Results

Test	Pretest *M*	Pretest *SD*	Posttest *M*	Posttest *SD*	*F*	Sig.
PACER	33.50	13.60	27.68	14.83	5.23	.033
90° Push-Up	15.77	8.78	16.41	7.90	.598	.448
Curl-Up	26.96	13.25	36.91	14.29	25.82	< .001
Back-Saver Sit and Reach	12.39	2.18	12.80	2.83	2.25	.148
Body Composition	20.13	7.34	18.65	7.65	14.61	.001

Table 3
Healthy Fitness Zones Met or Not Met at Pre and Post

Test	Met pre and post	Not met at pre or post	Not met at pre, met at post	Met at pre, not at post
PACER	1	21	0	0
90° Push-Up	12	5	4	1
Curl-Up	19	1	2	0
Sit and Reach	20	1	1	0
Body Composition	19	3	0	0

Physical Activity Recalls

IPAQ questions. Three positive correlations (one strong) were found between scores on the PACER posttest and MVPA reported on a physical activity recall. A significant positive correlation was found between PACER posttest scores and MVPA reported on Recall 1 ($r = .448$, $p = .037$), Recall 7 ($r = .677$, $p = .001$), and Recall 8 ($r = .451$, $p = .035$). Six positive correlations (two strong) were found between scores on the 90° Push-Up posttest and MVPA reported on a recall. A significant positive correlation was found between 90° Push-Up posttest scores and MVPA reported on Recall 1 ($r = .452$, $p = .035$), Recall 4 ($r = .452$, $p = .035$), Recall 5 ($r = .493$, $p = .02$), Recall 6 ($r = .539$, $p = .01$), Recall 7 ($r = .590$, $p = .004$), and Recall 8 ($r = .434$, $p = .044$). A significant positive correlation was found between Sit and Reach posttest scores and MVPA reported on Recall 7 ($r = -.493$, $p = .02$). Three negative correlations (one strong) were

found between readings on the Body Composition posttest and MVPA reported on a recall. A significant negative correlation was found between Body Composition posttest readings and MVPA reported on Recall 1 (r = -.569, p = .006), Recall 3 (r = -.460, p = .031), and Recall 6 (r = -.525, p = .012). The results of the comparisons of time spent in MVPA and fitness posttest scores are shown in Table 4.

Table 4
Correlations Between Time Spent in MVPA and Fitness Posttest Scores

MVPA recall	PACER post	Push-up post	Curl-up post	Sit and reach post	Body comp post
Recall 1					
Correlation Coefficient	.448*	.452*	.211	-.163	-.569**
Sig. (2-tailed)	.037	.035	.345	.469	.006
Recall 2					
Correlation Coefficient	.367	.273	-.051	.052	-.264
Sig. (2-tailed)	.093	.219	.823	.820	.235
Recall 3					
Correlation Coefficient	.218	.403	.057	-.059	-.460*
Sig. (2-tailed)	.330	.063	.800	.794	.031
Recall 4					
Correlation Coefficient	.077	.452*	.202	-.080	-.407
Sig. (2-tailed)	.732	.035	.368	.724	.060
Recall 5					
Correlation Coefficient	.359	.493*	.090	-.156	-.407
Sig. (2-tailed)	.101	.020	.689	.489	.060
Recall 6					
Correlation Coefficient	.400	.539**	.295	-.262	-.525*
Sig. (2-tailed)	.065	.010	.182	.239	.012
Recall 7					
Correlation Coefficient	.677**	.590**	.402	-.493*	-.316
Sig. (2-tailed)	.001	.004	.063	.020	.152
Recall 8					
Correlation Coefficient	.451*	.434*	.195	-.355	-.273
Sig. (2-tailed)	.035	.044	.385	.105	.218

Note. N = 22.
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Additional questions. Five cardiovascular endurance activities were reported between all physical activity recalls, including cycling, dance, running, swimming, and playing tag. Reported flexibility activities included stretching, Pilates, and yoga. Muscular strength and endurance activities varied the most, with 21 types of activities reported between all recalls. Reported activities included badminton, baseball, basketball, bowling, cheerleading, dodgeball, educational games, flying disc sports, golf, football, kickball, lacrosse, push-ups, racquetball, soccer, softball, tumbling, Ultimate, volleyball, weight lifting, and wrestling.

Relationship Between Motor Skills and Fitness

The Spearman's rho correlation coefficient revealed a significant relationship between pretest scores on the PACER and three of the selected educational gymnastics tasks and between pretest Body Composition readings and scores on two of the educational gymnastics tasks. A significant positive correlation was found between pretest scores on the PACER and the rolling action (r = .517, p = .014), the flight action (r = .598, p = .003), and the combination of skills (r = .480, p = .024). A significant negative correlation was found between pretest readings on Body Composition and the rolling action (r = -.481, p = .024) and between Body Composition and the flight action (r = -.451, p = .035).

The Spearman's rho correlation coefficient revealed a significant relationship between posttest scores on the PACER and two of the educational gymnastics tasks and between posttest scores on the Curl-Up and one of the educational gymnastics tasks. A strong positive correlation was found between the flight action and PACER posttest scores (r = .667, p = .001). A significant negative correlation was found between the sequence and PACER posttest scores (r = -.497, p = .019). A strong positive correlation was found between the step-like action and Curl-Up posttest scores (r = .648, p = .001). A correlation could not be reported between the rolling action posttest scores and any of the fitness posttest scores because 100% of the PETE students performed the rolling action at a Level 3 (the highest level) at posttest. The results of the pre- and posttest comparisons between motor skills and fitness are presented in Tables 5 and 6, respectively.

Table 5

Correlations Between Motor Skills Pretest and Fitness Pretest Scores

Motor skill	PACER Pre	Push-Up Pre	Curl-Up Pre	Sit and Reach Pre	Body Comp Pre
Rolling Action Pre					
Correlation Coefficient	.517*	.370	-.188	-.051	-.481*
Sig. (2-tailed)	.014	.090	.401	.823	.024
Balancing Action Pre					
Correlation Coefficient	-.103	-.109	-.287	-.140	-.031
Sig. (2-tailed)	.647	.629	.196	.533	.890
Step-Like Action Pre					
Correlation Coefficient	.199	.032	.364	.196	.060
Sig. (2-tailed)	.374	.889	.095	.383	.790
Flight Action Pre					
Correlation Coefficient	.598**	.354	.225	-.257	-.451*
Sig. (2-tailed)	.003	.106	.315	.248	.035
Combination Pre					
Correlation Coefficient	.480*	.052	.043	.198	-.120
Sig. (2-tailed)	.024	.819	.848	.376	.596
Sequence Pre					
Correlation Coefficient	.093	-.132	.142	.112	.065
Sig. (2-tailed)	.680	.560	.529	.618	.774

Note. $N = 22$.

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Table 6
Correlations Between Motor Skills Posttest and Fitness Posttest Scores

Motor skill	PACER post	Push-up post	Curl-up post	Sit and reach post	Body comp post
Rolling Action Post					
Correlation Coefficient	.	.	.	.	.
Sig. (2-tailed)	.	.	.	.	.
Balancing Action Post					
Correlation Coefficient	-.154	.037	-.073	.044	-.051
Sig. (2-tailed)	.494	.872	.746	.846	.822
Step- Like Action Post					
Correlation Coefficient	.381	.398	.648**	.105	-.168
Sig. (2-tailed)	.080	.067	.001	.642	.456
Flight Action Post					
Correlation Coefficient	.667**	.177	.001	-.084	-.254
Sig. (2-tailed)	.001	.431	.998	.709	.254
Combination Post					
Correlation Coefficient	-.023	.174	.181	-.172	.172
Sig. (2-tailed)	.918	.438	.421	.445	.443
Sequence Post					
Correlation Coefficient	-.497*	-.229	.095	.217	.048
Sig. (2-tailed)	.019	.304	.674	.332	.833

Note. $N = 22$.
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Discussion

Conclusions

This study examined the effects of an educational gymnastics course on PETE students' motor skill development and health-related fitness components. Based on the findings of the study, at least three conclusions can be drawn. The first conclusion is that instruction in an educational gymnastics course improves motor skill levels of PETE students. This is significant to teacher education because an

increase in motor skill proficiency reflects an increase in content knowledge in educational gymnastics. The findings provide evidence that activity courses such as the one delivered in this study help PETE programs contribute to the motor skill development/content knowledge of PETE students as mandated by the National Initial PETE Standards (NASPE, 2008). As a result of their increases in skill in educational gymnastics, the PETE students in this study may be better prepared to present educational gymnastics content to their future students.

A second conclusion is that instruction in an educational gymnastics course does not significantly improve the health-related fitness of PETE students on most of the fitness tests used in this study. Findings indicate that PETE students had significantly better abdominal strength and endurance and a lower percentage of body fat by the end of the course. However, PETE students' upper body strength and endurance and their flexibility did not improve significantly, and cardiovascular endurance appeared to be worse. Participation in the educational gymnastics course may have contributed to the improvement in scores on the Curl-Up and Body Composition tests. Many educational gymnastics tasks required PETE students to utilize their abdominal muscles, which may have favorably affected Curl-Up test scores. PETE students were engaged in MVPA at almost every class meeting, which may have contributed to a lower percentage of body fat by the end of the semester. Participation in physical activities outside of class time during the semester may also have contributed to improved scores. The results indicate that a relationship may exist between the time that the PETE students spend in MVPA outside of educational gymnastics class time and certain health-related fitness indicators at posttest. Activities reported on the physical activity recalls such as weight lifting may have affected Curl-Up test scores. Any of the 29 reported activities may have affected body composition. Additionally, PETE students' dietary patterns (which were not accounted for in this study) could have affected their body compositions.

Flexibility did not improve as significantly as expected after participation in an educational gymnastics course, and attention should be drawn to the PETE students' scores in relation to the FitnessGram HFZ ranges. Twenty of the 22 scores already fell within the HFZ

range on the Back-Saver Sit and Reach at pretest. Therefore, there may have been a ceiling effect in that the PETE students did not improve much further on this test at posttest. There may have been a similar ceiling effect on the 90° Push-Up test, for which 13 PETE students' scores already fell within the HFZ range at pretest. As for the PACER, results of the statistical test indicated that scores significantly decreased from pre- to posttest, but in terms of the HFZ range on the PACER, there were no changes in scores for any of the 22 PETE students from pre- to posttest. The standard deviation was large, meaning that data points (total laps scored) were spread out over a large range and there was a higher than normal amount of variability in the data. Motivation to perform may also explain the apparent decrease in cardiovascular endurance at posttest.

Standard 2 of the National Initial PETE Standards indicates that physical education teacher candidates should achieve and maintain a health-enhancing level of fitness throughout their programs. Physical education teacher candidates should meet the age- and gender-specific levels for each of the five components of health-related physical fitness using standards established for national-, state-, or program-level testing. Performing below the age- and gender-specific levels for just one of the five components of health-related fitness using standards established for national-, state-, or program-level testing is considered to be unacceptable (NASPE, 2008). Based on the PACER posttest scores alone, 21 of the 22 PETE students in this study had unacceptable fitness levels. Several performed below the age- and gender-specific levels for two or more of the five fitness tests. Strategies for more directly targeting fitness in PETE programs are needed. One possibility is to attempt to get more out of the content courses that majors take by targeting fitness in one or more of these courses within a PETE program.

A third conclusion is that although several significant relationships exist between motor skill level and health-related fitness, overall the results of this study do not provide overwhelming support for a relationship between motor skill competency and fitness. The only significant correlation between motor skills and fitness that was present at pre- and posttest was between the flight action and the PACER test. The relationships found support Webster et al. (2014), who examined the relationship between preservice teachers' health-related

fitness and movement competency in gymnastics. They found that skill on a variety of educational gymnastics tasks was significantly correlated with muscular strength/endurance, particularly on the Curl-Up test. The work of Webster et al. provided initial evidence that preservice teachers' health-related fitness is related to their movement competency.

Limitations

One limitation of this study was the relatively small sample size ($N = 22$) due to low enrollment in the educational gymnastics course. Another limitation was the lack of a control group. Enrollment in the course was too low to easily support using a control group, and it would have been unethical to have students enrolled in a required course for PETE majors be randomly assigned to sit out. A third limitation was the possible effect of physical activity participation outside of class time on participants' motor skill levels and health-related fitness.

Directions for Future Research

The results of this study are promising, particularly when it comes to the value of content courses in developing motor skills, but further research is needed. Studying the effects of physical activity courses on the development of motor skills in PETE students in content areas other than educational gymnastics is warranted. Expanding out of the area of educational gymnastics is important because different movement forms have the ability to affect fitness in different ways. There are as many possibilities for future studies here as there are content areas in physical education. Investigating the relationship between motor skill levels and teaching performance could be another extension of this study.

This study demonstrates the effects that one physical activity course in the content area of educational gymnastics can have on the motor skills and health-related fitness components of PETE students. The results of this study warrant broad support for the use of motor skill content courses to increase PETE students' motor skills in various content areas. PETE programs may use the evidence that this study provides to make important decisions regarding the inclusion of educational gymnastics and other content courses in their programs. These decisions will directly affect the content knowledge

of physical education teachers as they enter the field and ultimately the programs and students they serve.

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MOTOR SKILLS

Effects of Two Practice Style Formats on Fifth Grade Students' Motor Skill Performance and Task Engagement

Constantine C. Chatoupis and George Vagenas

Abstract

We investigated the effectiveness of two teaching formats that fall under the canopy of Mosston and Ashworth's (2008) practice style, on fifth grade students' motor skill performance and task engagement. Both formats are also known as station teaching or learning centers. In the teacher-rotated format (TR), the teacher decides the amount of time apportioned during practice at each station, whereas in the learner-rotated format (LR), each learner decides on task order and the amount of time spent at each station. Ten-year-old children (N = 60) were randomly assigned to the TR group (n = 20), the LR group (n = 25), and a control group (n = 15). A soccer dribbling test was employed to evaluate the soccer dribbling skill prior to and after the instructional intervention. The same soccer dribbling tasks were taught to the learners in both treatment groups in eight 30-min sessions. ANCOVA on the posttest scores showed a significant difference between the experimental groups and the control group ($p < .001$) and between the two experimental groups, favoring the LR group ($p < .001$). A 3 × 2 (Group × Test) repeated measures ANOVA showed a significant improvement of the soccer dribbling skill for both teaching formats ($p < .001$) but not for the control group. An ANOVA on the overall practice trial data yielded significant differences between the two formats, favoring the LR group ($p < .001$). Both formats were

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found to be effective, but the results indicate that given the opportunity to reapportion their practice time, learners in the LR format took advantage of this opportunity and improved their performance further.

The Spectrum of Teaching Styles (Mosston & Ashworth, 2008) is a pedagogical theory that provides a concrete model both for the systematic generation of research questions and as an organized repository for research results. Since 1970, numerous Spectrum studies have been conducted, and some of them have provided support for specific aspects of Spectrum theory (Byra, 2000; Chatoupis, 2009).

According to Mosston and Ashworth (2008), the Spectrum consists of a continuum of 11 landmark styles, each of which emerges as decisions shift between teacher and learner. The transition from one landmark style to another represents certain decisions being shifted. The decisions are organized in three mutually exclusive sets: (a) pre-impact (planning and preparation decisions), (b) impact (decisions made during the teaching–learning transaction that define the action), and (c) post-impact (feedback and assesment decisions).

A teaching style that has drawn the attention of many researchers is the practice style of teaching (Chatoupis, 2010). The practice style is the first in the Spectrum that involves the student in the decision-making process (Mosston & Ashworth, 2008). Nine decisions of the impact set are shifted to the learner. These decisions are posture (how to posture for the task), location (where to locate in the environment), order of tasks, starting time per task, pace and rhythm (how quickly to perform the task), stopping time per task, interval (the time between two tasks or parts of tasks), attire and appearance, and initiating questions for clarifications (when to ask questions about the task). During practice, the teacher observes students' performance and offers individual and private feedback to each learner. Also, the teacher is available to answer questions by the learners (Mosston & Ashworth, 2008). The teacher makes the pre- and post-impact decisions.

According to the literature, design variations of the landmark practice style are the most commonly used methods of instruction in PE settings (Kulinna & Cothran, 2003; Jaakola & Watt, 2011). In this study, we examined two design variations of the landmark practice style that have been used in a previous research (Goldberger & Gerney, 1990): the LR (Learner Rotated) and the TR (Teacher

Rotated) formats. Both formats are also known as *task teaching* (Siedentop & Tannehill, 2002) or *station teaching* (Mosston & Ashworth, 2008). In Spectrum terms, the LR and the TR formats fall under the canopy of the nearest landmark style, which is the practice style (Goldberger & Gerney, 1990).

The major difference between the two formats is the number of impact decisions being shifted to the learners. In the TR format, only three decisions are shifted to the learners: pace and rhythm, attire and appearance, and posture. In the LR format, all impact decisions are shifted to the learners except for location. Also, the difference between the two formats lies on how much time is apportioned during practice. In the TR format, learners have about the same amount of practice time on each task because the teacher decides on the starting and stopping time per task and consequently on the interval. In the LR format, learners make time decisions.

In a series of Spectrum studies, the practice style proved to enhance school children's motor performance in athletic activities including forearm pass (Griffey, 1983); rifle shooting (Boyce, 1992); hockey (accuracy task; Goldberger, 1983; Goldberger & Gerney, 1986; Goldberger, Gerney, & Chamberlain, 1982), soccer ball juggling (Beckett, 1991); volleyball spike (Harrison, Fellingham, Buck, & Pellett, 1995); striking with a racket (Jenkins & Byra, 1997); and volleyball passing, serving, and setting (Zeng, Leung, Liu, & Bian, 2009).

Perhaps most relevant to the present study, Goldberger and Gerney (1990) examined the effects of two organizational formats that are presented within the instructional framework of the practice style of teaching. Under the TR format, the participants, fifth grade boys and girls, rotated from station to station, in a specific order, every few minutes on the command of the teacher. Under the LR format, the fifth graders decided the order in which to rotate (from station to station), the amount of time to spend at each station, and when to rotate (from station to station). Goldberger and Gerney found both formats to be effective in fostering students' learning. In addition, they found the LR format to be more effective for the low-ability students than the high-ability students.

In summary, when students are given the opportunity to share in the decision-making process, their progress toward achievement

in the psychomotor domain becomes great (Lydon & Cheffers, 1984; Mosston & Ashworth, 2008).

To date, the amount of practice time that learners achieve in the practice style of teaching has not been investigated thoroughly. Because learners in the LR format are given the opportunity to work individually, to make time decisions, and to receive frequent teacher assistance, several researchers hypothesized that the practice style would provide the conditions for increased practice time (Gerney & Dort, 1992; Goldberger, 1984, 1992; Goldberger & Gerney, 1990; Goldberger et al., 1982). Contrary to this hypothesis, Goldberger and Gerney (1990) found that learners in the TR format engaged in more practice trials than did their LR counterparts. More recently, Byra, Sanchez, and Wallhead (2014) found that the amount of time that students spent in fitness activities was similar among the command, practice, and inclusion styles.

Although there is a surge of literature in which teacher and student behavior within the landmark practice style has been explored, little is currently known about the effects of two formats that function under the canopy of the landmark practice style on psychomotor learning outcomes as well as on the amount of practice time students spend. This is the second Spectrum study to examine the effects of narrowing down the configuration of decisions to a small cluster on certain variables. Given this scarcity of empirical evidence, it seems important that this area of investigation receive further attention from researchers. Therefore, the purpose of the study was to investigate the effectiveness of the TR and LR formats on the soccer dribbling skill performance and on practice trials.

Based on the previously discussed research, we addressed three hypotheses: (a) Both formats are effective in facilitating improved motor performance over time. (b) The LR format is more effective in developing learners' motor performance than is the TR format. (c) Because learners in the LR format make time decisions, they are involved in more practice trials than are learners in the TR format.

Findings from the present research are critical to educators because they can help them to broaden their understanding of the benefits and limitations of shifting impact decisions to children while they learn motor skills. In addition, this information may provide insight on effective ways of structuring the learning environment to increase practice time in PE.

Method

Participants

Sixty children from three fifth grade classes of a rural public school in a southern region of Greece participated in the study (M_{age} = 10.11 years, SD = 0.15). The participants were Greek Caucasian with similar socioeconomic background (middle class). Children were chosen based on the following criteria: (a) They had experience with receiving instruction within the practice style because their PE teacher taught them with that style in the previous school years, (b) they did not exhibit behaviors that could hinder the teaching–learning process, and (c) they had similar experience in the soccer dribbling skill in that none of them were junior athletes in local soccer clubs and none participated in extracurricular soccer activities. The children were randomly assigned to the TR group (n = 20), the LR group (n = 25), and the control group (n = 15).

Inequality in the group sizes in this simple unrestricted randomization (Schulz & Grimes, 2002b) was due to keeping gender analogies constant and partially to the post facto exclusion of a few participants having difficulties in doing the test. Children did not know to which group they were assigned. Therefore, the experiment was single blinded (Schulz & Grimes, 2002a).

The learners were taught by the same male instructor, who had 5 years of teaching experience in elementary PE settings. As a postgraduate student and later as an in-service teacher, the instructor was trained in the appropriate use of the Spectrum of Teaching Styles. In addition, in his most recent years of teaching, the instructor taught elementary school children using many of Mosston and Ashworth's (2008) teaching styles, including the practice style of teaching. The participants in this study did not previously know the instructor in the sense that he was not the PE teacher of the school. Having one instructor provide all instruction helped to control for unplanned variability in the instructor factor (Goldberger & Gerney, 1990). The parents of the children signed consent forms for their child's participation in the study.

Setting

The study lasted 4 weeks. Physical activity instruction was provided two times a week, 30 min/session, thus giving eight sessions for each group. Instruction took place in a gymnasium that the learners used during their regular PE lessons. The gymnasium could comfortably hold up to 25 children at one time. The children received an orientation to the instruction prior to the first session. This included an introduction to the expectations of the teaching style and familiarization with the instructor, the gymnasium, and the equipment.

All sessions taught to the treatment groups were audio–video recorded using a video camera recorder (handycam) attached on a tripod. The handycam offered a sensitive built-in microphone, a large viewing screen, powerful zoom ability, and instant playback. Sessions taught to the control group were audio–video recorded once a week. The video camera was positioned to capture the movements of all learners and the instructor. It was located in a discreet place to reduce the participants' reactivity to it. The instructor was wearing a wireless microphone so that his voice could be recorded. The video-recorded lessons were viewed by two coders to ensure teaching style implementation and by the researcher and an independent rater to estimate learners' task engagement.

Session Content

The content of each session was based on the skill theme development approaches, as described by Graham, Holt/Hale, and Parker (2010). In particular, the tasks included traveling in pathways with the ball and dribbling around stationary obstacles. For example, each learner has a ball and dribbles the ball around the outside of the cones in his or her own personal space, or learners dribble their soccer ball following a certain path with curves drawn on the ground. The design and the selection of the tasks were based on information provided in Mosston and Ashworth's (2008) and Graham et al.'s (2010) textbooks.

Interventions

Treatment groups. For the purposes of this study, the gymnasium was divided into six stations and one soccer dribbling task was assigned to each station. During the first session of both for-

mat groups, the instructor began by stating the reasons for using the practice style and explaining the role of the instructor and the learner. He also asked and answered questions for role clarification. Then he described and demonstrated the soccer dribbling tasks to be executed and explained the criteria sheet. The criteria sheet included written and/or pictorial instructions on how to complete the tasks, information on the quantity of the tasks, and space for learners to check off each task when completed. To ensure participation and serious effort, the instructor told the learners they would be tested on the soccer dribbling skill at the end of the 4-week practice. Before practice began, he solicited and answered questions for task clarification.

Under the TR format, the instructor divided the class into six groups and assigned each group to one of the six stations. Then he gave them the following instruction: "Every group can spend only 5 minutes in each station; upon my signal they should move to the next station. The six rotations will take about 30 minutes. The location, order, starting time, stopping time, and interval decisions are made by me." Upon the command "Begin now!", the learners started practicing the tasks.

Under the LR format, the instructor told the learners they could choose the order of the tasks and move individually to the stations of their choice. To prevent stations from being overcrowded, no more than five learners were allowed to be at each station. He also asked them to complete all tasks and to be accountable for making all eight impact decisions. Before practice time, the instructor made the following statement:

> You will have about 30 minutes to work. Decide how you are going to use your time efficiently. It would make sense to spend the minimal amount of time on those tasks you can already do or you can learn to do easily. Do them quickly and check them off on your task card. This will provide you with additional time to spend on those tasks that need the most work. Really focus on those tasks in which you need the most work, and remember, you will be tested on these skills at the end of the unit. (Goldberger & Gerney, 1990, p. 88)

Upon the command "You may begin when you are ready," the learners started practicing the tasks.

Under both formats, the instructor moved around the classroom, monitored task and role performance of learners, and offered individual and private feedback to learners. In particular, the instructor identified the learners who were making errors in either the performance of the soccer dribbling task or the decision-making process (i.e., adherence to the decisions of the impact set). Then he offered corrective feedback to the individual learner and stayed with him or her to verify the corrected behavior before he moved on to the next learner. At the end of each session, the instructor offered general feedback to learners for role performance and collected task sheets.

Control group. Learners assigned to the control group were involved in PE activities because the researcher did not want to deprive them of participating in some form of physical activity. A study can be more valuable to the extent that the control and experimental groups are similar except that the control group receives no treatment or an alternative treatment to that given to the experimental group (Gall, Borg, & Gall, 1996). Therefore, the learners in the control group formed small teams of three or four participants and took part in mini football games. During game time, the instructor circulated and provided private feedback only for organizational/managerial and discipline purposes.

Instrumentation

The soccer dribbling skill test (Keith, 1980) was administered before and after the intervention to assess learners' soccer dribbling skill. Pre- and posttesting took place in the gymnasium. The pretest session occurred 1 day before the study started and the posttest session 1 day after the completion of the study. Each testing session lasted about 50 min.

Six cones were set up 2 yd apart over a distance of 10 yd. Each learner was instructed to begin with the ball at her or his feet at the first cone and dribble in and out of the cones in a zigzag fashion around the end cone and back to the starting point. Time was measured (to the nearest tenth of a second) from the moment the learner made contact with ball (player-initiated test) until both learner and ball crossed the finish line. Each learner performed two timed trials, with the lowest (fastest) timed trial being recorded. In case a learner

misses a cone, he or she has to return and properly circle it. Time represents the participants' skill outcome score.

Learners' Task Engagement

Following Goldberger and Gerney's (1990) measurement method of task engagement, we counted the number of practice trials taken by each learner during sessions. The practice trials for each learner were tallied each day and were summed up to obtain the total trials for each learner. Learners' task engagement was analyzed to determine which of the two format groups used practice time more efficiently. Using Scott's coefficient (van der Mars, 1989), we estimated an intraclass reliability coefficient of 0.90.

Teaching Style Verification

Fidelity between the instructor's behavior and the style-specific behaviors was ascertained through systematic observation using the style analysis checklist for the practice style (Sherman, 1982). The checklist requires a coder to determine whether the teacher or the learner exhibited the behavior in each statement. The practice style checklist contains 28 style-specific teacher/student statements that are organized in five categories: (a) role identification (e.g., describes the "shift" in nine decisions), subject matter identification (e.g., announces the tasks), (c) performance of the task, (d) evaluation feedback (e.g., evaluates learners, offers individual and private feedback to learners about task and roles), and (e) end-of-lesson ceremony (e.g., offers feedback to learners for role performance). A modification of this checklist was used to verify that the instructor's behavior was congruent with the LR and TR formats.

The teacher should exhibit 26 of the possible behaviors for pure LR format implementation and 25 for pure TR format implementation. The learner should exhibit the remaining behaviors. Behaviors that are not exhibited or exhibited by the incorrect party (teacher or student) are not circled (Ernst & Byra, 1998). Sherman (1982) established scores of 21 (80%) and above to verify style implementation. In the current study, scores of 24 (74%) were obtained from the two trained coders. Fidelity between the instructor's behaviors and the style-specific behaviors was therefore ascertained.

Coder Reliability

The two coders were trained by the author to use the practice style checklists. Training lasted approximately 3 hr. Initially, the coders learned to analyze practice style teaching episodes by coding eight practice style episodes under the supervision of the researcher. Following, the coders analyzed eight more practice style episodes independently. Each style analysis checklist was then compared to the researcher's results. Practice continued until interobserver and intraobserver agreement, estimated with Scott's coefficient, exceeded 0.75. An 84% intraobserver and an 89% interobserver agreement level were obtained.

Data Analysis

Mean, standard deviation, and confidence interval scores were calculated for each dependent variable (soccer dribbling skill scores and practice trials) and for each group. To investigate the first hypothesis, we employed a 3 × 2 (Group × Test) repeated measures analysis of variance (ANOVA). The soccer dribbling posttest scores were analyzed using an analysis of covariance (ANCOVA), with the soccer dribbling pretest scores serving as the covariate. To investigate differences between the two formats as to the number of practice trials, we used an analysis of variance (ANOVA) on the overall practice data.

Eta-squared was also computed to assess effect size in an effort to determine the degree to which the intervention affected soccer dribbling skill performance and the number of practice trials. The 0.05 level of significance was employed for all analyses.

Results

Skill Performance

Apart from normality and homoscedasticity, for an ANCOVA to be valid, independence between treatment and covariate, model linearity, and equal regression slopes are assumed (Keppel & Wickens, 2004; Rausch, Maxwell, & Kelley, 2003).

Normality in the unadjusted and the adjusted scores was confirmed by visual inspection of the normal Q-Q and box-plots, and by testing its significance using the Kolmogorov–Smirnov test (pretest scores, $p = 0.193$; posttest scores, $p = 0.200$; adjusted scores,

p = 0.200). The data were homoscedastic (pretest Levene = 0.562, p = 0.573; posttest Levene = 0.500, p = 0.609). The covariate was independent of the treatment, $F(2, 57) = 0.341$, $p = 0.713$. The fitted model complied with the assumption of linearity as confirmed by a lack of fit test, $F(1, 55) = 0.226$, $p = 0.960$, with the correlation between the covariate and the posttest scores being highly significant ($r = 0.70$, $p < 0.001$). Finally, the regression slopes were about equal, as the Group × Pretest interaction was not significant, $F(2, 54) = 0.798$, $p = 0.456$.

An ANCOVA on the posttest soccer dribbling scores revealed a significant effect of the treatments, $F(2, 56) = 29.536$, $p = .0001$, $\eta^2 = 0.51$, 95% CI [23.10, 23.75], after adjusting for the highly significant covariation of the pretest soccer dribbling scores, $F(1, 56) = 93.69$, $p < 0.001$. A Bryant-Paulson generalization of Tukey's HSD procedure, as a post hoc test, revealed that both treatment groups significantly outperformed the control group ($p < .001$) and the LR group significantly outperformed the TR group ($p < .001$). The pretest and posttest mean and standard deviation scores for the soccer dribbling skill and the confidence intervals are presented in Tables 1 and 2, respectively.

Table 1
Soccer Dribbling Skill Scores and Practice Trials by Group and Test

		Soccer dribbling skill				
Group	***n***	**Pretest *M* (*SD*)**	**Posttest *M* (*SD*)**	**Adj. posttest[a] *M* (*SD*)**	***p***	**Practice trials *M* (*SD*)**
TR	20	24.93 (1.63)	23.55 (1.89)	23.39 (1.218)	.001	13.56 (1.16)
LR	25	24.54 (1.79)	21.73 (2.11)	21.93 (1.220)	.001	21.55 (1.39)
Control	15	24.86 (1.60)	25.07 (1.82)	24.97 (1.218)	.12	–

[a]Adjusted soccer dribbling scores.

Table 2
Confidence Intervals by Group and Test

	Soccer dribbling skill			
Group	Pretest 95% CI	Posttest 95% CI	Adj. posttest 95% CI	Practice trials 95% CI
TR	[22.67, 24.44]	[24.17, 25.70]	[22.84, 23,93]	[12.98, 14.15]
LR	[20.86, 22.61]	[23.80, 25.28]	[21.44, 22.42]	[21.02, 22.07]
Control	[24.07, 26.08]	[23.98, 25.75]	[24.34, 25.60]	–

A 3 × 2 (Group × Test) repeated measures ANOVA showed a significant interaction between groups and test, $F(2, 57) = 29.323$, $p = 0.001$, $\eta^2 = 0.51$. Post hoc analysis for the soccer dribbling scores revealed a significant improvement from pretest to posttest for the TR and LR groups ($p < .001$), but not for the control group.

Learners' Task Engagement

An ANOVA on the overall practice data revealed a significant effect for groups, $F(1, 43) = 423.641$, $p = 0.001$, $\eta^2 = 0.91$, 95% CI [17.16, 17.95]. Learners who were taught under the conditions of the LR format engaged in more practice trials than did those taught within the TR format (see Tables 1 and 2).

Discussion

Skill Performance

Learners in the LR group and the TR group showed significant improvement from pre- to posttest, whereas learners in the control group did not. This result corroborates previous research findings (e.g., Goldberger & Gerney, 1986, 1990; Goldberger et al., 1982; Harrison et al., 1995; Jenkins & Byra, 1997; Zeng et al., 2009) attesting to the effectiveness of the practice style. The first hypothesis of the study was supported.

It makes sense to suggest that the improvement over time of both groups may be due to the way the instructor structured the learning environment: Learners had to move through a series of stations that were set up for different tasks. It has been argued that the use of learning centers or stations can motivate students to learn (Graham, 2008; Mosston & Ashworth, 2008).

As in previous research (Goldberger & Gerney, 1990), in this study learners' improvement over time under the LR format was greater than that of their counterparts in the TR format. This result indicates that learners can be given some decision-making responsibility and maintain a level of achievement greater than the achievement of learners exposed to a learning environment in which the teacher makes most of the decisions (as in the TR format).

The second hypothesis of the study was also supported: The adjusted LR and TR posttest means were significantly different from each other, with the LR group being superior to the TR group (see Tables 1 and 2). Unlike learners in the LR group, learners in the TR group were allowed to make only three decisions (pace and rhythm, posture, and attire and appearance). Given Mosston and Ashworth's (2008) premise that the greater the amount of student input into decsions, the greater their progress of the learner toward achievement of psychomotor objectives, it makes sense to postulate that the difference in soccer dribbling skill performance between the two formats may be due to the greater amount of decision-making power learners were afforded in the LR group. In a similar study, no difference was found between the two formats, and only for low-ability learners did the LR group prove to be most effective (Goldberger & Gerney, 1990).

Another plausible reason for this difference was that learners in the LR group were involved in significantly more practice trials than students in the TR group (see Table 1). This gave them the opportunity to practice more which, in turn, may have been responsible for their increased performance in soccer dribbling. However, the reader should be cautious not to infer any causal relationship between practice time and increased performance in the LR group, because based on the statistical analysis no such inference can be made.

Learners' Task Engagement

It was also hypothesized that learners in the LR group would practice more than learners in the TR group. This hypothesis as well as many pedagogues' argument that the practice style can provide the conditions for increased practice time (Gerney & Dort, 1992; Goldberger, 1984, 1992; Goldberger & Gerney, 1990; Goldberger et al., 1982) was supported (see Tables 1 and 2).

Unlike learners in the TR group, their counterparts in the LR group were given the opportunity to make time decisions (i.e., starting time per task, pace and rhythm, stopping time per task, interval). Because learners in the LR group could manipulate their allocated time per task, they seized this opportunity to complete more trials. That was not the case in previous research, because learners had not understood the concept of reallocating practice time and the incentives had not been powerful enough to influnce their behavior (Goldberger & Gerney, 1990) or they had little experience in decsion making (Byra et al., 2014).

It can be contended that in this study the researcher took steps to make sure that learners would take advantage of their opportunity to practice and make more productive use of allocated time. In particular, (a) the researcher talked to the learners about the concept of reallocating practice time; (b) the learners were reminded that they would be tested on the soccer dribbling test at the end of the sessions and to be involved in serious efforts and participation; and (c) learners were able to hold themselves accountable for making certain decisions, because they were already familiar with the practice style of teaching.

In a research where, among other things, middle-school-aged children were taught with a student-paced practice method (as in the LR format), it was found that this method was associated with more practice (Silverman, Woods, & Subramaniam, 1998). Mosston and Ashworth (2008) have suggested this, and the present research has provided some empirical evidence for that suggestion.

Implications and Recommendations

In this study, both formats proved to be effective in promoting learners' motor performance. Considering that both formats represent organization options of station teaching and decision-sharing models of teaching, PE teachers who value outcomes related to the psychomotor domain and to increased learner responsibility can employ either format.

In station teaching, learners do not have to wait in long lines to practice and adequate amounts of space and equipment are provided. Such conditions can motivate learners to learn (Graham, 2008; Mosston & Ashworth, 2008). Likewise, learners' decision making (e.g., the various formats of the practice style) can lead to increased

performance in the psychomotor domain (Mosston & Ashworth, 2008). Apart from gains in motor performance, the LR format can also aid learners to assume more self-responsibility (Byra et al., 2014, Goldberger & Gerney, 1990).

If educators are to provide learners with more practice time and encourage further achievement, they need to employ the LR format in which learners are allowed to make time decisions. By manipulating their allocated time per task, learners can achieve more engaged time. Appropriate practice trials or engaged time has been found to be a strong correlate to student achievement in the psychomotor domain (e.g., motor skill acquisition; Lee & Poto, 1988; Metzler, 1989; Rink, 2006; Silverman, 1990).

However, teachers have to be alert with learners' lack of personal social responsibility associated with making decisions. Siedentop and Tannehill (2002) stressed that for educators to use task teaching well, learners need to have good self-control skills. In addition, shift in decision-making responsibility may lead to less active time, especially when learners are not accustomed to making decisions (Byra et al., 2014).

Although our findings merit the attention of practitioners, the study is not without limitations. The small sample size and that the sample may not be representative of the population cast doubts about the generalizability of the findings. A further limitation is the inability of some students to take the soccer dribbling test (they missed or hit most cones). These students had to be excluded from the study, which reduced the sample size further.

More replication studies as well as further research conducted with different age groups, sports skills, and other teaching styles are needed. If studying the effects of a small group of decisions can reveal the implications of configuring decisions on learning, then employing formats that fall under the canopy of other landmark styles makes sense. In addition, there is a lack of knowledge as to how much engaged time the Spectrum teaching styles allow learners to spend. Therefore, it would be interesting to investigate the amount of practice time that learners spend in teaching styles other than the practice style and if this is related to achievement.

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MOTOR SKILLS

Motor Skill Assessment in Autism Spectrum Disorder: A Case Study

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Abstract

Without proper motor assessment, children with autism spectrum disorder may be placed in educational settings that are inappropriate for their motor abilities. However, many practitioners find it challenging to choose which assessment to use to assess these children, especially with the number of instruments available. The purpose of this study was to present findings from a case study that compared and contrasted four widely used developmental instruments (i.e., Bruininks–Oseretsky Test of Motor Proficiency-2, BOT-2; Movement Assessment Battery for Children-2, MABC-2; Peabody Developmental Motor Scales-2, PDMS-2; and Test of Gross Motor Development-Second Edition, TGMD-2) that were designed for motor skill assessment for children. A 5-year-old boy with autism participated in the study and completed all four motor skill assessments. The child completed all gross motor skills included on the four assessments, within the gymnasium of the local elementary school, and fine motor skills were assessed in a quiet room. Results revealed that the child performed better on the PDMS-2 and the BOT-2 out of the four instruments. In conclusion, each motor assessment instrument has strengths and limitations. Practitioners and researchers should consider their assessment goal when selecting a testing instrument. If the goal is to increase time engaged in

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on-task behavior, a quantitative approach such as the MABC-2 and the BOT-2 may be best. If the goal is to describe qualitative changes, the TGMD-2 may be best. If the goal is to assess qualitative and quantitative performance, the PDMS-2 may be best.

Motor skill development is important for the health and well-being of children of all abilities. Children who are able to perform fundamental motor skills such as running, jumping, galloping, throwing, kicking, or catching at high levels of proficiency are also more physically fit, less obese, and less at risk for hypokinetic disease (Stodden, Gao, Goodway, & Langendorfer, 2014).

Researchers can assess motor skill development in children using qualitative and quantitative approaches. Qualitative assessment provides information about the process of a movement and describes how an individual moves. This detailed information is valuable to therapists and researchers, but it is not without cost. This type of assessment is often resource intensive, as it takes more time to complete and often requires researchers to have extensive training to produce valid and reliable analysis of performance exhibited during the assessment. Quantitative approaches provide numeric measurements of the outcome (e.g., distance ran), and qualitative approaches describe how the outcome was produced. Although this approach is usually less taxing on the researcher's resources, it can omit important information regarding skill performance. Researchers report that children with disabilities, including autism spectrum disorder (ASD), sometimes use a movement strategy that is not congruent with the approach for the assessment, to achieve the task required during the assessment (Berkeley, Zittel, Pitney, & Nichols, 2001; Breslin & Buchanan, 2014; Breslin & Rudisill, 2011; Green, Baird, & Barnett, 2002; Staples & Reid, 2010; Yun & Shapiro, 2004). Therefore, with a quantitative approach, a child may earn a high score for performance because of an ability to complete many repetitions, when in fact the child uses improper form.

Some assessments (e.g., the Test of Gross Motor Development-Second Edition, TGMD-2) have two approaches, with a numerical value being assigned to the presence or absence of an aspect of skill performance. However, this approach may cause confusion as well. For example, the TGMD-2 jumping task includes four performance criteria that must be met for "successful" jumping perfor-

mance. However, the success of the jumping task on the Movement Assessment Battery for Children-2 (MABC-2) is based on the number of consecutive jumps a child performs. The main criterion of success for the MABC-2 jumping task is that children must jump within the boundaries of the mats and perform one jump per mat. Thus, the maturity of the jumping movement is not measured, and a child who can only complete one jump could earn the same numerical scores on both assessments, even if the quality of the movement is very different (Logan, Robinson, & Getchell, 2011; Ulrich, 2000). The jumping tasks in the Peabody Developmental Motor Scales-2 (PDMS-2) and the Bruininks–Oseretsky Test of Motor Proficiency-2 (BOT-2) are measured via the distance where jumping from the start point (the line) to the point where the back of the nearest heel touches the floor. The score given to the child is based on the distance without attention to the qualitative criterion used to perform the jump.

The increasing prevalence of ASD has made the use of motor assessment in understanding the motor skill performance of children with ASD a high priority for researchers and practitioners. Because many motor assessment instruments are available for testing, there is not one gold standard instrument to investigate motor skill performance of children with ASD, especially because none are designed exclusively for this population (Piek, Hands, & Licari, 2012). However, researchers must choose the assessment for a particular study based on the purpose of that study, rather than based on reasons of convenience (Logan et al., 2011; Staples, 2013; Yoon, Scott, Hill, Levitt, & Lambert, 2006). Thus, the purpose of this study was to compare and contrast four instruments designed for motor skills assessments, the MABC-2, TGMD-2, PDMS-2, and BOT-2, using a case study approach.

Method

Participants

The participant was a 5-year-old boy with high functioning autism, who was diagnosed at 4-years-old. The child completed all gross motor skills included on the four assessments, within the gymnasium of the local elementary school, and fine motor skills were assessed in a quiet room. The principal investigator conducted all four assessments and obtained the most up-to-date information regarding

the child's diagnosis, behavioral and sensory preferences, and social communication skills from the school psychologist, who based these on the results of the child's performance on the Preschool Language Scales-Fifth Edition (PLS-5) and the Developmental Profile-Second Edition (DP-2). Specifically, the child exhibited difficulty with the tasks included on the PLS-5, scoring at or below the 5th percentile for auditory comprehension, expressive communication, and total language. Furthermore, the child had poor performance on the DP-2, earning below average scores on the subtests of physical, adaptive behavior, and social-emotional skills. The school psychologist also reported that the child exhibited impulsive behaviors and a preference for interaction with adults and some children, and it is possible that the difficulties with language and adaptive skills reported on the DP-2 and PLS-5 could have influenced performance on other assessments, including those in the motor domain.

The principal investigator has a doctorate in motor behavior and over 15 years of experience in conducting motor assessment experiments on children. She had extensive trainings on administrating the four instruments when she was a master student, and she completed motor assessment data collection on over 1,000 children.

Instrumentation

The child's motor performance was assessed using four motor skill assessments. Beyond following the directions in the instruction manual for each of these assessments, the investigator used additional empirically proven strategies for improving understanding during motor skill assessments. Specifically, demonstrations and pictures were displayed to convey the essence of the skill to the child, and simple, short verbal instructions were provided alongside these demonstrations and pictures (Breslin & Rudisill, 2011; Liu & Breslin, 2013a).

Bruininks-Oseretsky Test of Motor Proficiency-Second Edition. The BOT-2 (Bruininks & Bruininks, 2005) measures a combination of gross and fine motor proficiency in children aged 4 to 21 years old. When administered in short form (14 items), it takes between 15 and 20 min to finish. The complete form with 53 items takes about 45 to 60 min. The BOT-2 short form is used as a screening tool for children with ASD, and the complete form must be used for detailed assessment for children who had problems on

the short form. The BOT-2 evaluates skills in eight subtests: fine motor precision, fine motor integration, manual dexterity, upper limb coordination, bilateral coordination, balance, running speed/agility, and strength. The BOT-2 has been used with children with ASD (Gabriels et al., 2012; Hilton et al., 2014; Pan, 2014; Vivanti, Nadig, Ozonoff, & Rogers, 2008).

Movement Assessment Battery for Children-Second Edition. The MABC-2 (Henderson, Sugden, & Barnett, 2007) assesses fine and gross motor skills of children aged 3–16 years in developmentally appropriate activities that vary across three age bands (3–6 years, 7–10 years, 11–16 years) in a valid and reliable way in under 30 min. Thus, older children are provided more challenging activities accounting for their improved manual dexterity as a function of typical motor development. It has been successfully used to assess the motor skillfulness of children with ASD (Brown & Lalor, 2009; Green et al., 2002; Green et al., 2009; Henderson et al., 2007; Liu & Breslin, 2013a, 2013b).

Peabody Developmental Motor Scales-Second Edition. The PDMS-2 (Folio & Fewell, 2000) is a valid and reliable instrument appropriate for children from birth to 5 years of age. It contains six subscales, albeit one (reflexes) is only used for children less than 1 year old. Thus, children of school age can be assessed using subscales measuring stationary action, object manipulation, visual–motor integration, grasping, and locomotion. It has been used to assess children with ASD (Lloyd, MacDonald, & Lord, 2011; Provost, Heimerl, & Lopez, 2007; Provost, Lopez, & Heimerl, 2007; Vanvuchelen, Roeyers, & De Weerdt, 2007; Zachor, IIanit, & Itzchak, 2010)

Test of Gross Motor Development-Second Edition. The TGMD-2 (Ulrich, 2000) assesses the gross motor skills of children aged 3–10 years using two subtests comprising six locomotor skills (run, gallop, hop, leap, jump, and slide) and six object control skills (strike a stationary object, dribble, catch, kick, overhand throw, and underhand roll). It is a valid and reliable tool used in many physical education classes in the United States to determine if a child qualifies for adaptive physical education (Ulrich, 2000). Given its evaluative purpose and that it takes less than 30 min to administer, it has also been popular for use with children with ASD (Berkeley et al., 2001; Breslin & Rudisill, 2011, 2013; Liu, Hamilton, Davis, & ElGarhy,

2014; MacDonald, Lord, & Ulrich, 2013; Pan, Tsai, & Chu, 2009; Staples & Reid, 2010).

Procedures

The child's gross motor skills on four instruments were completed in the gymnasium, and fine motor skills were assessed in a quiet room. The child entered the testing environment and was provided the instructions for the assessment items; instructions came from the instruction manuals for each assessment. The principal investigator administered all the assessment items and provided demonstrations to the child. No other children or research assistants were present during testing. Besides following the assessment directions in the instruction manual for each test, the investigator used additional strategies for improving the child's understanding of each skill performance. Specifically, the investigator gave demonstrations and displayed pictures to convey the essence of the skill to the child. The investigator also provided simple and short verbal instructions with the demonstrations and pictures (Breslin & Rudisill, 2011; Liu & Breslin, 2013a). The assessment was performed over a short time. That is, a break was given between each subtest to keep the child focused on tasks, and reinforcements were used (e.g., playing with a tennis ball or other favorite activities after each task) to motivate him to complete the assessments.

Results

The results of the study suggest variations in the level of delay reported as a function of the assessment used. The child earned scores in the 5th percentile for the MABC-2, with his performance classified as significant movement difficulty compared to his peers. On the PDMS-2 and TGMD-2, his performance was classified as below average, as he performed his motor skills in the 16th percentile on both assessments. However, his performance on the BOT-2 yielded higher scores, earning him a classification of average skill level (21st percentile). Specifically, based on his BOT-2 scores on fine motor precision, fine motor integration, and manual dexterity, he was classified as average.

Exploring the results on the different subtests for each assessment yields a more distinct picture. Full results of performance on these subtests are shown in Table 1. To summarize, the child's score

on the manual dexterity test on the MABC-2 suggested below average performance, whereas performance on the fine motor precision, fine motor integration, and manual dexterity subtests on the BOT-2 suggested average motor skill performance. Disparity between the BOT-2 and the MABC-2 balance subtests also existed. On the MABC-2, the boy's scores again suggested below average performance, whereas on the BOT-2 his performance was average. Disparity also existed between the PDMS-2, MABC-2, BOT-2, and TGMD-2 scores. For the object manipulation subtest in the PDMS-2 and aiming and catching subtest in the MABC-2, the child scored average in comparison to the norms, with performance at the 25th percentile and 50th percentile. However, he was classified in the 9th percentile for the object control skills subtest on the TGMD-2 and in the 12th percentile for the upper limb coordination subtest on the BOT-2, earning him the classification of below average.

Discussion

Results of the study were consistent with the literature suggesting children with ASD had delayed motor performance in some or all subtests in four motor assessments (Chen, 2013; Stodden, True, Langendorfer, & Gao, 2013; Stodden et al., 2014; Williams et al., 2008). Because this study was intended to be descriptive in nature, no hypotheses were made with respect to the consistency of classification of the child's skill performance across the four motor assessments included in this study. Furthermore, the child's performance on each assessment was consistent with the data collected prior to testing. That is, he scored below average on the PDMS-2 in physical behavior, adaptive behavior, and social-emotional behavior. However, differences in the level of observed delays in motor performance among assessments may be related to differences in criteria used for each testing instrument. The child's performance was similar on the PDMS-2, BOT-2, and TGMD-2, which may indicate that certain subtests (e.g., locomotion or object control or object manipulation) measure similar motor skill performance constructs. The PDMS-2 and the BOT-2 are designed to assess motor proficiency in a more detailed manner than the MABC-2 and the TGMD-2. The MABC-2 is a screening tool to identify children at risk of movement difficulty and to describe general motor competence. The TGMD-2 is based on the qualitative assessment of gross motor skills. Many gross motor skills tested in the TGMD-2 are more related to sport.

Table 1
Participant Scores on the Assessment Instruments and Time Spent in Each Assessment

	MABC-2	PDMS- 2	TGMD-2	BOT- 2
Time spent in testing	25 min	75 min (2 testing sessions)	27 min	120 min for the complete form
Subtests Standard Scores (SS) **Percentile (Descriptive Category)**	**Manual Dexterity** SS: 7 Percentile: 16th (Below average) **Aiming & Catching** SS: 10 Percentile: 50th (Average) **Balance** SS: 3 Percentile: 1st (Below average)	**Reflexes:** NA **Stationary** SS: 7 Percentile: 16th (Below average) **Locomotion** SS: 7 Percentile: 16th (Below average) **Object Manipulation** SS: 8 Percentile: 25th (Average) **Grasping** SS: 8 Percentile: 25th (Average) **Visual–Motor Integration** SS: 9 Percentile: 37th (Average)	**Locomotor** SS: 9 Percentile: 37th (Average) **Object Control** SS: 6 Percentile: 9th (Below average)	**Fine Motor Precision:** 13 (Average) **Fine Motor Integration:** 15 (Average) **Manual Dexterity:** 16 (Average) **Upper Limb Coordination:** 12 (Below average) **Bilateral Coordination:** 12 (Below average) **Balance:** 10 (Average) **Running Speed & Agility:** 13 (Average) **Strength:** 11 (Well below average)

Table 1 (cont.)

	MABC-2	PDMS- 2	TGMD-2	BOT- 2
Quotients, SS, Percentile, or Total Motor Composite (Descriptive Category)	**Total Test Score**: 54 SS: 5 Percentile: 5th (Significant movement difficulty)	**Gross Motor Quotient:** 83 Percentile: 13th (Below average) **Fine Motor Quotient:** 91 Percentile: 27th (Average) **Total Motor Quotient:** 85 Percentile: 16th (Below average)	**Gross Motor Quotient:** 85 Percentile: 16th (Below average)	**Strength and Agility:** Percentile: 24th (Average) **Manual Coordination:** Percentile: 42th (Average) **Body Coordination:** Percentile: 14th (Below average) **Fine Manual Control:** Percentile: 38th (Below average) **Total Motor Composite**: Percentile: 21st (Average) **Short Form Composite**: Percentile: 21st (Average)

The differences in performance between assessments may be related to differences in criteria for performance on specific items. For example, tasks exploring fine motor skills on the BOT-2 require a different kind of performance than do tasks exploring fine motor skills on the MABC-2. The MABC-2 has a larger performance target size than does the BOT-2. An implication of Fitts' Law, which states that movement time is a function of the target size (Fitts, 1954), is that the child may have felt more relaxed on the MABC-2 because the target size was larger. Anecdotally, the researchers believe this to be true because successful performance on the extremely precise items on the PDMS-2 require a level of stillness not observed during data collection. The researchers recommend that the PDMS-2 is the assessment to select if the goal is to obtain the highest scores, because of repetition of classes of actions. For example, in the PDMS-2 stationary subtest, the child earned a total score of 5 on three standing-on-one-foot tests. He scored 2 on Item 20 for standing on one foot for 3 s (i.e., quantitative assessment item), 2 on Item 21 for standing on one foot for 5 s, 1 on Item 23 for standing for 3 s on one foot with hands on hips and without swaying more than 20 degrees (i.e., qualitative item), and 0 on Item 27 because he could not stand on one foot without swaying more than 20 degrees for 5–10 s.

The PDMS-2 is designed according to motor developmental stages; therefore, some items are repeated. In addition, chronological age is used to determine the test start point. The PDMS-2 also uses a basal and ceiling level, making the time spent on testing shorter. The PDMS-2 provides comprehensive assessment on a child's motor performance. For example, the PDMS-2 includes 16 quantitative and qualitative testing items to assess jumping performance. Each testing item evaluates a different aspect of jumping (Table 2).

Table 2
Item Number, Jumping Position, and Description for 16 Jumping Tests in PDMS-2

Item number	Jumping position	Description
49, 61, 67, 76, 81	Jumping forward	Jumping forward using 2-footed takeoff and landing.
51, 58, 62	Jumping down	Standing on stable object, jumps down without assistance using 2-footed takeoff and landing.
63, 84	Jumping hurdles	Jumps over string without tripping using 2-footed takeoff and landing.
72	Jumping forward on one foot	Jump forward on 1 foot without letting other foot touch floor.
50, 55, 73	Jumping up	Jumps up with feet together and touches line.
82	Turning jump	With body not deviating more than 20 degrees from vertical, jump and turn 180 degrees. Land with feet opposite original position.
87	Jumping sideways	With feet together and without pausing, jump back and forth (sideways) over line.

Because the PDMS-2 is appropriate for children from birth to 5 years, the researchers recommend the BOT-2 as a detailed motor assessment for children older than 5 years of age. The BOT-2 assesses motor proficiency of prekindergarten children, adolescents, and young adults. Some BOT-2 test items assess different aspects of motor proficiency using similar task. For example, in the balance subtest, the child scored 3 on Item 3 (standing on one leg on a line with opened eyes for 9 s), 2 on Item 6 (standing on one leg on a line with closed eyes for 3 s), 1 on Item 7 (standing on one leg on a balance beam with opened eyes for 2.07 s), and 1 on Item 9 (standing on one leg on a balance beam with closed eyes for 1 s).

Future researchers should consider completing case studies like this one on children of various ages (with matching PLS-5 and DP-2 scores) to determine if there is an age effect with the assessments rather than a communication effect. Even though these assessments are designed for use with people of a range of ages (e.g., MABC-2 for those aged 3–16 years, TGMD-2 for those aged 3–10 years, BOT-2 for those aged 4–21 years, and PDMS-2 for children from birth–5 years old), it is possible that there are age effects that must be explored. Thus, replicating this study with 3- and 4-year-old children might yield further clarification as to which motor assessment is most useful in determining the motor abilities of children with ASD.

Conclusion

Each motor assessment instrument has strengths and limitations. Practitioners and researchers should consider their assessment goal when selecting a testing instrument. If the end goal of conducting an assessment is to compare performance to specific criterion (and/or to the performance of gender and age-matched peers), the TGMD-2 or the PDMS-2 might be the most appropriate assessment instrument. When comparing scores on these assessments to normative data for age and gender, researchers can assess a child's achievements during the assessment using a performance orientation (as opposed to a mastery orientation). If the goal is to assess the ability to perform repetitive actions, it is possible that the MABC-2 (or other assessment that measures success by the quantity of a certain skill that can be performed) would be most appropriate. The PDMS-2 and the BOT-2 both measure the distance a child covers while performing certain motor skills, so these might be appropriate if measuring or assessing endurance measures.

Therefore, when determining which of these assessments to use, researchers need to consider the goal of the assessment and intervention. A combination of assessments may yield the most detailed picture of the nature of motor performance in this population (Staples, 2013). If the goal is to increase time engaged in on-task behavior, a quantitative approach may be best such as the MABC-2 and the BOT-2. If the goal is to describe qualitative changes in motor performance, the TGMD-2 may be the best assessment instrument to use. If the goal is to assess both qualitative and quantitative performance, the PDMS-2 may be the best assessment instrument to use.

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PEDAGOGY

Beyond "Fun": The Real Need in Physical Education

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Abstract

As obesity rates and physical inactivity levels continue to rise among American youth, the need for quality physical education programs is more important than ever. However, to many observers, physical education is a hindrance to academic time and a subject that does not bring value to the educational system. It is imperative for physical educators to advocate for and substantiate the true importance of the discipline. Children of today's generation have limited experiences being in a physically demanding environment, but have many opportunities, especially through technology, to be in a "fun" environment; thus, there is a push for physical education and physical activity overall to be fun. However, children who are not physically challenged do not develop the mental fortitude to persevere and succeed in physically demanding activities and many other aspects of life in general. The physical education classroom is an ideal setting to foster a challenging and engaging environment that can help develop the skills, knowledge, fitness, mental resiliency, and self-confidence to succeed and continue in physical activity and fitness enhancement. Maintaining a sole focus of fun in physical education will not bring on the behavioral change desired for lifetime activity and fitness, because the skills needed for such endeavors will not be thoroughly established. The purpose of this article is to

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jump-start a crucial conversation among academicians about the importance of presenting challenging and engaging educational environments that align with the educational groundwork that has shaped the physical education field. Through a demanding and rigorous physical education curriculum, students will better develop the required skills and confidence to continue in lifetime activity and fitness, and fun will be a lasting by-product.

With obesity rates and the prevalence of hypokinetic diseases exponentially increasing across all age groups (Centers for Disease Control and Prevention [CDC], 2015a, 2015b), the need for physical education (PE) in schools is at an all-time high (Pate et al., 2006; SHAPE America, 2013). Recent research has also established a positive correlation between physical activity and academic performance (CDC, 2010). Paradoxically however, PE programs within schools are under attack, facing budget cuts, increased requirements for academic time dedicated to standardized testing and/or higher level courses for college acceptance, and an overall stance of many K–12 administrators that PE does not bring value to the school day with its poor program curriculum (Brink, 2002; Dakss, 2005; Marshall & Hardman, 2000; McKenzie & Lounsbery, 2009; Sealey, 2010).

In light of these realities, PE professionals should ask themselves the question, are we making a lasting impact that brings value to our profession? The answer should be resoundingly yes, yet as evidenced by the consistent upsurge in sedentary behavior across all ages (Katzmarzyk, 2010; Thorp, Owen, Neuhaus, & Dunstan, 2011), many PE programs fail to bring true value to students to be lifetime participants in physical activity (PA) and fitness. PE may not be the "silver bullet" that will change behaviors of an entire generation, but it can nevertheless serve many. Specifically, an impactful PE program can stimulate student growth and interest in lifetime PA and fitness by facilitating students' motor skill development, health-related fitness, health-related fitness knowledge, overall PA levels, sport/game performance, and social skill set (SHAPE America, 2013). It is certainly time to jump-start a crucial conversation among academicians about the importance of presenting challenging and engaging educational environments that align with the educational groundwork that has shaped the physical education field.

To further elaborate on the perspective of an impactful approach to PE, in this article we compare and contrast the notion of challenging engagement with simply implementing "fun" within the PE context. From a PE and psychology of sport and exercise standpoint, there is a recent push for PA to be fun or at the very least pleasant (Werle, Wansink, & Payne, 2014). This push has been derived from psychological principles of hedonism and pleasure. Hedonism is the view that a good life is a pleasant life (Feldman, 2004), and the pleasure principle view states that people avoid pain and seek pleasure (Freud, 1951). Consistent with these tenets, within the PE realm there appears to be a tendency to make PE fun with the prospect that this will facilitate students' lifetime PA participation (Garn & Cothran, 2006). However, reducing PE to just fun may not result in long-term adoption of PA and maintenance of fitness across the lifespan. In the advocation for change, it is not sufficient to suggest or endorse one particular curriculum to be implemented on a national level. Rather, the hope is to impose a call to action for educators and creators of PE curricula to consider an alternate approach to the learning environment in which PE classes are taught.

Fun: A By-Product of Quality Physical Education

Fun, defined in Merriam-Webster dictionary as amusing, entertaining, enjoyable, or lighthearted pleasure, can be the by-product of a quality PE program for which the primary objective is engaging the students to learn, develop, grow, persevere, and succeed. This proposition further aligns with the pedagogy of PE as described in the goals, standards, and vision set forth by SHAPE America and the National Association for Sport and Physical Education (NASPE):

- "To develop physically literate individuals who have the knowledge, skills and confidence to enjoy a lifetime of healthful physical activity" (SHAPE America, 2013, p. 1).
- "To pursue a lifetime of healthful PA, a physically literate individual has learned the skills necessary to participate in a variety of physical activities, knows the implications and the benefits of involvement in various types of physical activities, participates regularly in PA, is physically fit, and values PA and its contributions to a healthful lifestyle" (SHAPE America, 2013, p. 1, adapted from NASPE, 2004, and Mandigo, Francis, Lodewyk, & Lopez, 2012).

- "A quality physical education program provides learning opportunities, appropriate instruction, meaningful and challenging content, and student and program assessment" (NASPE, 2013, p. 1).

The five national standards, briefly defined, include (1) competency in movement, (2) apply knowledge to movement and performance, (3) achieve a health-enhancing level of PA and fitness, (4) engage in responsible personal and social behavior, and (5) recognize the value of PA (SHAPE America, 2013). Through evaluation of these goals and standards, we deduct that growth and development leading to appreciation and continued behavior should be the consistent focus in PE rather than simply having fun.

For the notion of fun, it is also important to note that in today's society the luxury of convenience and instant gratification is of utmost prevalence. As such, along with technological advancements, basics of everyday life often come quick and easy and are achieved with the least effort from individuals (Dzewaltowski, 2008; Ng & Popkin, 2012). From fast food to motorized transportation, from smart gadgets to countless other innovations, individuals do not have to exert the physical work and/or mental perseverance that was once required to fulfill daily tasks and needs (Ng & Popkin, 2012). Although today's physical inactivity levels are not exclusively due to emerging technologies, such technological advances have contributed to the decrease of outdoor manual labor chores or chores for youth in general (Ng & Popkin, 2012; Rende, 2015).

Technology: Rise of the Machines

Furthermore, current technological advancements have altered the perception of PA for many people. When it comes to PA and fitness, technology has aided in the development of a sedentary generation that routinely watches TV, plays video games, and/or spends a vast amount of their time on the Internet via computer or phone (Active Healthy Kids Canada, 2011; Rideout, Foehr, & Roberts, 2010; Straker, Abbott, & Smith, 2013). In regard to instant gratification, technological advances have afforded children with a figurative and literal restart button, allowing them to restart or change a game that may not have been as good or as fun, much like the instant Internet

search tool that provides a shortcut from mental digging and investigating (Rideout, 2012).

From a practical standpoint, when children leave school the majority will choose sitting indoors, eating junk food, and playing video games over being outside in the elements and participating in physically demanding activities (Wiecha et al., 2006). The inside sedentary activities are much easier than PA and bring enjoyment/fun to many kids, and in fact children can connect wirelessly with one another to socialize and even play video games together without leaving their homes. Thus, it can be argued that the mentality of fun and instant gratification help sedentary amusement supersede PA for many people.

Importance of Physical Activity in Helping Develop Important Psychological Skills

Physical work and many forms of PA help build mental toughness (Gerber et al., 2012). It is plausible that as technological advancements surface, the need for physical work and PA decrease, and thus fewer opportunities to develop mental fortitude to push beyond comfort arise. The lack in mental perseverance as a result of decreasing physical work is important to consider, because mentally tough individuals "have a high sense of self-belief and unshakable faith that they can control their own destiny; these individuals can remain relatively unaffected by competition and adversity" (Clough, Earle, & Sewell, 2002, p. 38). Consequently, failure to develop mental toughness may hurt a person's chances of successfully mastering life's challenges and succeeding in high-pressure environments (Connaughton, Hanton, & Jones, 2007).

Participation in high school sports provides a challenging and engaging learning environment that is focused on skill development and high levels of PA and fitness. High school sports and PE are separate entities with different characteristics (e.g., competitive emphasis, specialized activity vs. multiple activities, student choice vs. requirement), but PE professionals need to consider the relevant qualities between the two. The most pertinent connection is the mental fortitude developed through the challenging high school sports environment that is similarly transferrable in the PE setting.

Research indicates that individuals who participate in high school sports are more active as adults than are nonparticipants (Alfano, Klesges, Murray, Beech, & McClanahan, 2002; Dohle & Wansink, 2013; Perkins, Jacobs, Barber, & Eccles, 2004; Tammelin, Nayha, Hills, & Jarvelin, 2003; Team-Up for Youth, 2010; U.S. Department of Education, 2005). Additional evidence also suggests that high school sport participants report higher levels of self-esteem and possess greater leadership ability (U.S. Government Accountability Office, 2012), and varsity high school athletes are more likely to go to college and earn more money as adults than are nonathlete college graduates (U.S. Department of Education, 2005). Personality traits and ability levels play an intricate role in the subsequent success of high school sport participants, but the concept of challenging and engaging growth in children by fostering a work ethic that takes children beyond their perceived limits can be paralleled. The demanding environment of high school athletics helps student-athletes develop a mental fortitude and drive for success, along with skill and fitness development. From this, PE professionals can derive how impactful challenging PA is to students' overall development. However, if students are not challenged to develop the mental skills and fitness attributes that precede success, they will likely have difficulty finding lasting enjoyment or confidence to pursue further PA and fitness endeavors.

An additional element for physical educators to consider with respect to high school and youth sport participation is that the majority of students (73% of youth 6–12 years and 60% of youth 13–17 years) do not participate in competitive PA on a weekly basis (Sports and Fitness Industry Association, 2013). For such students, PE is the main avenue to enhance skill, knowledge, mental resiliency, and appreciation of PA and fitness and the subsequent health benefits derived from incorporating PA into their daily life. This does not require PE students to be "athletes." As a matter of fact, PE should not be centered on athletics, but rather show students that it is not necessary to be an "athlete" to be successful in physical movement, activity, and fitness. Confidence in performing PA and enhancing fitness can be produced by a curriculum that challenges students to engage and succeed, rather than one that offers "fun" activities.

In light of the aforementioned issues and the multitude of other factors that hinder PA participation and fitness in youth and adults, physical educators must reevaluate their intentionality toward what they want and need to accomplish in their classroom. Consequently, they should consider the following proposition: "Yes, we can offer appealing games and let the kids have fun and play, but is that truly going to make a long-term difference?" Such an approach may make a difference in momentary PA gains that in turn could enhance fitness, but the sustainability becomes limited without the intentional development of skills and knowledge. Students need to find success, confidence, and mental resiliency within the PE classroom, but they cannot fully accomplish this without educators creating an environment that fosters challenge and engagement beyond students' typical comfort zone.

It is important to note, however, that play and fun are an integral part of a child's development and help improve decision making, creativity, self-confidence, social interaction, physical skill, and other valuable traits (Ginsburg, 2007). It is also known that the more a person likes an activity, the more he or she is likely to repeat that activity in the future (Woolford et al., 2012). Hence the incorporation of fun can reinforce a desired behavior, and children should indeed spend time in free play and PA exploration. Conversely, the PE classroom is not a controlled recess in which the teacher's role is that of a supervisor and facilitator of free play. Students should and need to have more opportunities for free play, and physical educators should be at the forefront to advocate for more recess and PA in school and out of school. Nonetheless, the PE classroom should be based on a curriculum that challenges and facilitates improvement of motor skills, fitness levels, fitness knowledge, and social aptitude with the prospects of helping each student achieve self-confidence, find success, develop mental toughness, and appreciate physical work and activity.

In fact, the perspective presented herein closely coincides with self-determination theory (Ryan & Deci, 2000), which purports that competence, autonomy, and relatedness are the motivations that guide individual behavior. A PE program that provides a sense of competence through skill mastery, a sense of autonomy through realistic challenges, and a sense of relatedness through the group na-

ture of its setting could tap into the deeper intricacies of human behavior or more specifically into what makes the behavior a long-term habit. Because of its educational rather than play-based emphasis, such an approach to PE is also consistent with the zone of proximal development (Vygotsky, 1978), which postulates that in educational settings, a learning process occurs between an experienced adult and a child to close a "gap" in the child's knowledge. Physical educators can also advance the relatedness of their curriculum within the academic classroom setting by collaborating with other educators and bridging the concepts typically reinforced solely within the school's gymnasium across an entire curriculum or learning agenda through providing either short PA breaks within the school day or incorporating PA into lesson plans (CDC, 2010).

Some argue that a PE program needs a challenging curriculum to push students beyond comfort levels; however, such a curriculum can shy students away from PA and fitness. But this argument does not hold, given that when reflecting back on the negative aspects of their PE experiences, individuals do not seem to contest rigor (Rikard & Banville, 2007). In fact, evidence indicates that especially among female students and less skilled students, there seems to be unease and uncertainty about forced competition in common sporting games in which male athletes with more skill are considered competent and dominate the event (Myrick, 1996; Rikard & Banville, 2007). This is important because individuals who do not consider themselves competent or confident in an activity are less likely to participate in said activity (Warner et al., 2014). With many physical educators using large-sided games as a vast part of the curriculum, PA is possible but the educational attainment and engagement becomes limited. Challenging students to work hard and push themselves is not preventing or hindering the development of lifelong PA; in retrospect, the lack of a rigorous and challenging curriculum may be the very reason why students are not continuing in PA (Dismore & Bailey, 2011). Particularly relevant herein: Success breeds success. Meaning, if we as PE professionals are able to engage students in developing the skills, knowledge, fitness, mental resiliency, and self-confidence via a rigorous and challenging mastery approach curriculum, we will likely make more of an impact on students' lifetime PA levels than we would with a curriculum centered on game playing and having

fun (Ferrer-Caja & Weiss, 2000; Parish & Treasure, 2003; Standage, Duda, & Ntoumanis, 2003).

Conclusion

There is a need for a shift from fostering environments that are simply fun to challenging and engaging educational environments that align with the (foundational) physical education groundwork that has shaped the PE field. Although this shift would push students out of their comfort zones and possibly impinge on their momentary enjoyment and desires, it would simultaneously provide students with true learning opportunities beyond play. Those learning opportunities are the foundation to a lifetime of PA and healthy fitness levels, which will inevitably lead to a higher quality of life (Anokye, Trueman, Green, Pavey, & Taylor, 2012). Physical educators need to respond to this call to action to challenge their students beyond the simple curriculum of learning a few skills and then playing games to get the students momentarily physically active and appease the students' enjoyment levels. As stated, PE is indeed not a controlled recess, but when treated like one the value of the profession and the need for the discipline become discredited. Physical educators can and should push their students to levels not thought possible and truly equip them with the physical, cognitive, social, and mental skills to be physically active for a lifetime. A strategic shift toward challenging and engaging environments will help clear the negative perception around the worth of PE classes in schools (Brink, 2002; Dakss, 2005; Marshall & Hardman, 2000; McKenzie & Lounsbery, 2009; Sealey, 2010) and ultimately reestablish PE as a responsibility and priority of any quality educational system.

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PEDAGOGY

High School Females' Emotions, Self-Efficacy, and Attributions During Soccer and Fitness Testing in Physical Education

Ken R. Lodewyk and Amber Muir

Abstract

Female enthusiasm toward engaging in physical education decreases significantly with age. This has been linked to, among other things, the negative emotional experiences that sometimes occur when learning and participating in a variety of curricular content such as games or fitness activities. Little is yet known about how females' enjoyment, state anxiety, social physique anxiety, self-efficacy, and causal attributions vary between such content. In this study, we examined how levels of these constructs differed between soccer and fitness testing units in 67 female students in Grade 9 physical education. Results revealed higher levels of affect in fitness testing than in soccer, specifically in state anxiety ($p = .04$), social physique anxiety ($p = .008$), and the attributions that "something can be changed" ($p = .003$) and "is because of me" ($p = .01$). Students' concerns in the fitness testing unit were mainly apprehension about their performance and physical appearance (i.e., athletic physique), whereas in soccer they were more concerned with social comparisons, how their skills were being assessed, and their lack of skill ability. This, coupled with the prediction ($p = .003$) of soccer unit performance ratings by emotions and beliefs (notably self-efficacy; $p = .003$), provides new insight into how these units might uniquely challenge students.

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School-age females tend to be less active, have lower and declining rates of enrollment in optional physical education (PE), and often develop more negative affiliations to PE in early adolescence compared to school-age males (Dishman et al., 2005; Lenskyj & Van Daalen, 2006; O'Brien, Martin Ginis, & Kirk, 2008). This concerns educators and health care professionals because students' attitudes toward PE relate to their overall physical activity and healthy lifestyle behaviors (S. Duncan, 1993; Hairul, Grove, & Whipp, 2008; Smith & St. Pierre, 2009). Based on the social-cognitive perspective used in this study (Bandura, 1986), these trends and affiliations are due to the dynamic interaction of environmental factors, personal characteristics, and behavior as part of a person's ongoing initiatives to regulate and control learning to attain personal goals. Learners' beliefs and emotions are among the numerous influences on students' attitudes, engagement, and achievement in movement settings such as PE, and these fluctuate according to contextual factors such as instructional content (S. Duncan, 1993; Barr-Anderson et al., 2008). In other words, units such as games and fitness testing taught in PE provide students with different environments, tasks, and learning situations that influence their motivation, emotions, and subsequent achievement (Bandura, 1986; Smith & St. Pierre, 2009). For example, research has shown that adolescent females' emotional, social, and cognitive needs are often compromised in PE programs that emphasize competitive sport, skill-based learning, and fitness testing wherein performance tends to be prominent and salient to others (Smith & St. Pierre, 2009; O'Brien et al., 2008). More insight is needed into relations among various combinations of beliefs and emotions and how they fluctuate and differ across specific content in PE (Lirgg, 2006). Therefore, the aim of this study was to investigate quantitatively and qualitatively unit-specific (soccer and fitness testing) differences in high school female PE students' emotions (state anxiety, enjoyment, and social physique anxiety) and beliefs (attributions and self-efficacy) and how each predicts students' unit performance ratings.

Games and Fitness Testing

Territorial games—including soccer as the most played sport globally—are the most commonly taught content in most high school PE programs (Baron & Downey, 2007). The understanding, develop-

ment, and assessment of health-related fitness for regular personal physical activity across the life span is also a core element of most high school PE curricula (Harris, 2005). Researchers have reported varied students' experiences, beliefs, and emotions in fitness testing and in territorial games such as soccer. For example, Silverman, Deng Keating, and Phillips (2008) reported that appropriate fitness instruction and experiences can increase the rate of physical activity among sedentary youth including those not involved in competitive sport. Meanwhile, when learning games in PE, students enjoy the playful participation, healthy competition, and autonomous pursuit of successful personal development, motor skills, tactics, and teamwork, and they report elevated levels of perceived competence and less emotional and behavioral disturbances (Donaldson & Ronan, 2006; Lirgg, 2006). On the other hand, students also experience less enjoyment (Smith & St. Pierre, 2009), counterproductive attributions (Baron & Downey, 2007), and negative feelings of embarrassment, boredom, and shame during the learning of games in PE (Pringle, 2010), particularly when they are taught with an overemphasis on external rewards (i.e., winning), evaluations, and public performances (Ridgers, Fazey, & Fairclough, 2007). Female students appear to be more drawn to cooperative and novel individual activities such as dance and aerobics (Hairul et al., 2008; Lenskyj & Van Daalen, 2006).

Although controversial (e.g., Harris, 2005), fitness testing is often used in PE to provide students with feedback about their fitness status using a variety of and mainly criterion-referenced assessments such as the sit-and-reach test for flexibility, sit-ups and pull-ups or the flexed arm hang for muscular endurance and strength, the 20-meter shuttle run for agility and speed, the standing broad jump for explosive power, and the "Beep Test" or 12-minute run test for cardiorespiratory endurance (Ortega et al., 2008). On the other hand, some forms of fitness assessments—such as those focusing on increasing students' understanding of fitness concepts and their benefits, along with engagement in authentic, formative, transferable, success-oriented, and personally meaningful procedures (i.e., self-set goals, scoring, and evaluating)—have been associated with advantageous levels of student motivation and effort regardless of most ability levels (Silverman et al., 2008; Wiersma & Sherman, 2008). It appears, however, that fitness testing often consumes most of the time

allotted for fitness learning, occurs near the beginning and end of the course with many teachers awarding marks for improvements across tests (Wiersma & Sherman, 2008), and unnecessarily promotes public comparisons and competition among students (Cale & Harris, 2009; Harris, 2005; Silverman et al., 2008). Furthermore, research (e.g., Silverman et al., 2008) suggests that minimal if any corresponding increases in physical activity or levels of fitness and health knowledge occur as a result of fitness testing units and that many students experience boredom, enter class unprepared, and do not enjoy, take seriously, value, or understand the purpose of fitness testing; in fact, many find creative ways to avoid or cheat at it. It is unclear how the experiences of learning games, such as soccer and fitness testing in PE, might uniquely constrain the very learning objectives they were designed to achieve by elevating counterproductive levels of state emotions such as anxiety and by compromising students' enjoyment, self-efficacy, and attributions.

State Emotions

Compared to more chronically experienced (trait-like) emotions, state emotions are "acute responses to stimuli and are representative only of a particular moment in time" (Plattner et al., 2007, p. 157). Among these are three emotions, enjoyment, state anxiety, and social physique anxiety, that sometimes affect students' engagement and participation in physical activity settings such as PE and sport (Motl, Dishman, Saunders, Dowda, Felton, & Pate, 2001). Enjoyment—a "positive affective state that reflects generalized feelings such as pleasure, liking, and fun" (Scanlan & Simons, 1992, p. 203)—is a consistent predictor of motivated engagement in movement settings (Barr-Anderson et al., 2008; Hairul et al., 2008). For example, adolescent females tend to experience anxiety and less enjoyment, motivation, and self-efficacy for performance in PE (Lenskyj & Van Daalen, 2006), especially if they are overweight (Fairclough & Stratton, 2006) and inactive outside of school (Barr-Anderson et al., 2008). Conversely, the more positive affective outcomes among adolescent females in PE are associated with increased meaning and value for the content, a respectful and collaborative teacher–pupil and social environment wherein they feel safe and empowered, choice from a greater diversity of physical activities beyond tradi-

tional sports, and experiencing assessment and teaching strategies that are more individualized (Flintoff & Scraton, 2006).

State anxiety involves being cognitively, emotionally, and physically tense about something particular, which often prompts or is prompted by feelings of vulnerability and fear, a lack of desired control, and lowered self-efficacy, cognitive processing (e.g., memory, attention control, retrieval efficiency), and performance (Pintrich & Schunk, 1996). These and other negative effects of anxiety on motivation and performance have been reported in PE, particularly among students with body image concerns (Lodewyk, Gammage, & Sullivan, 2009). Liukkonen (2007) and others (e.g., Ridgers et al., 2007) have reported that students often attribute negative emotions (i.e., insecure, fearful, nervous, and inadequate) with their PE experiences to the competitive, comparative, and evaluative dynamics in certain PE settings. These feelings of anxiety tend to increase in uncontrollable physical (e.g., low fitness, inadequate body size or shape), psychological (e.g., low interest, dislike of subject), and environmental (e.g., poor facility and equipment) situations. However, these and other researchers (e.g., Smith & St. Pierre, 2009; Wiersma & Sherman, 2008) have also reported that engagement in PE can be fostered despite some inherent anxiety if (among other factors) students perceive challenges to be positive and within their ability level.

Physical activity researchers (e.g., Eklund, Mack, & Hart, 1996) have also explored a subcategory of anxiety called social physique anxiety (SPA). SPA refers to anxiety that people experience when they have a negative perception of their body form and structure (e.g., as objectively unattractive) and when they feel their body is being negatively evaluated by those around them (Hart, Leary, & Rejeski, 1989).

SPA is often exacerbated in physical activity settings such as PE (deterring subsequent participation in it) when participants feel less competent in their ability to perform the necessary skills. This occurs particularly in activities that highlight and prompt peer comparisons and negative evaluations of a participant's performance and physique by others (Hart et al., 1989; Ridgers et al., 2007). Little is known about how SPA differs by content in PE.

Self-Efficacy and Attributional Beliefs

As a foundational construct of social cognitive theory (Bandura, 1986), self-efficacy refers to a person's judgment of and confidence in his or her abilities to perform a given task successfully in various circumstances. It is a consistent predictor of engagement, volume, performance, and cardiovascular fitness in physical activity settings such as PE (Gao, Newton, & Carson, 2008; Lirgg, 2006) and of achievement-related factors such as persisting and learning strategically despite challenges and experiencing more enjoyment and less anxiety (Dishman et al., 2005). The nature of instructional content (i.e., type, level of difficulty, and exposure time of learning tasks) and learners' previous engagement (e.g., effort) and experiences (e.g., success or failure, anxiety, enjoyment) with that content may influence self-efficacy (Chase, 2010; Dishman et al., 2005), with correspondingly negative implications on level of physical activity engagement in and out of school (Lirgg, 2006).

Attributions have also been linked to achievement-related beliefs, emotions, and instructional content in movement settings (e.g., Baron & Downey, 2007; Chase, 2010; Weiss, Ebbeck, McAuley, & Wiese, 1990). Weiner (2005) defines attributions as global (trait-like) or specific (relative to behavior, time, or situation) causal judgments about the reasons for an occurred success or failure categorized through the locus of responsibility, stability, and controllability factors. Locus of responsibility is the extent to which the cause of a performance is internal (e.g., ability and effort) or external (e.g., task difficulty and luck) to the individual. Stability refers to the duration and variance of the cause variable ranging from stable (e.g., consistent) to unstable (e.g., temporary and fluctuating). Controllability reflects the degree to which the individual can or cannot affect the outcome (how controllable or uncontrollable). To illustrate, students tend to have more advantageous levels of self-efficacy and emotions when they attribute their success to internal, stable, and personally controllable factors. For example, pride increases when success is attributed to internal factors, and guilt and shame decrease if success is attributed to external and uncontrollable causes. Little is yet known about how attributions relate to emotions and self-efficacy and if they differ as a function of games and fitness testing in PE.

Research Questions

This study was framed around three research questions whose answers could contribute valuable insight into high school females' beliefs and feelings during two curricular units that may show ways to engage females for heightened motivation in PE. First, are beliefs (self-efficacy and attributions) and emotions (anxiety, enjoyment, and SPA) significantly correlated? We anticipate that beliefs and emotions are significantly correlated based on previous studies that show positive relations between internal, stable, and controllable attributions for success and higher physical self-esteem and more advantageous emotions in youngsters (Baron & Downey, 2007; Weiner, 2005; Weiss et al., 1990). Second, do self-efficacy, attributions, anxiety, enjoyment, and SPA predict students' estimates of unit performance? Because of the scant research on this question relative to the games and fitness testing setting of this study, we forgo a hypothesis in favor of describing and discussing the findings. Third, do beliefs (self-efficacy and attributions), emotions (anxiety, enjoyment, and SPA), and estimates of unit performance differ between soccer and fitness testing quantitatively and qualitatively? As reported earlier, students report both negative and positive emotions toward features in games and fitness testing units. For example, although most females prefer individual over team activities (Hairul et al., 2008), many enjoy team games in conditions of clear skill and performance expectations, adequate challenge, positive social interactions, and peer affiliations characterized by a sense of belonging, comfort, cooperative teamwork, learning, and the building of friendships (Smith & St. Pierre, 2009). Fitness testing is often less enjoyed by adolescent females because it tends to increase self- and peer awareness of body performance and size (Harris, 2005), although this and clear performance standards may provide students with more credible information from which to attribute performance to internal factors (Weiner, 2005). Consequently, we posit lower enjoyment and self-efficacy and higher anxiety, SPA, and attributions (internal, stable, and controllable) in fitness testing than in soccer.

Method

Participants

The sample for this study consisted of 67 students (aged 14–15) from four compulsory female (single-gender) Grade 9 PE classes in two Catholic high schools located at opposite ends of a moderately sized (population 250,000) city of southwestern Ontario, Canada. Two of the classes (n = 34) were engaged in a five-lesson (1-week) soccer unit taught by the same female teacher (Marisa), and the other two classes (n = 33) were engaged in a five-lesson (1-week) fitness testing unit and were taught separately by two female teachers (Jessica and Patti).

Procedure

After the attainment of ethical approval from necessary levels and the notification of participants of the confidentiality of their data, students completed a short (5–7 min) survey periodically (near the end of their first, fourth, and fifth class of the unit). This periodic pattern of survey administrations enabled the researchers to get a more balanced assessment of students' self-efficacy. The PE teacher administered the surveys after reading a scripted protocol, that we created, that introduced the study and its measures. An additional short (2 min) demographic survey was administered with this measure on the first day of the unit and an additional seven-item attributions survey was included on the final day of the unit.

Teachers and Units

The complex and situated nature of learning renders it impossible to account for all the variance between classes and teachers; nevertheless, we purposely selected classes that were relatively similar demographically and shared consistent content, assessments, and pedagogy. Each of the PE classes followed the provincial Healthy Active Living Education curriculum (Ontario Ministry of Education and Training, 1998), which includes significant emphasis on games and fitness outcomes. A semistructured interview with each of the three teachers revealed that each had significant teaching experience with this Grade 9 course (9–25 years). Each teacher also emphasized learning to be active and healthy for life in an approachable context

of developmentally appropriate cooperation, physical and socioemotional safety, enjoyment, variety, and consistent routines so students were aware of their expectations. All teachers highlighted the importance of students experiencing a positive learning environment, because most students enter the class with negative associations toward PE, most have not experienced PE in a single-gender setting, and it is their first and only mandated high school PE course. Patti appeared to most use constructivist learning theory in her teaching, expressing that her students were at the center of learning and often helped to structure and lead the activities.

In terms of the classes, the soccer unit taught by Marisa occurred during the first and fifth periods of the school day. The lesson routine for the soccer classes began with a 10-min aerobic warm-up (choice of various activities such as basketball, skipping, and power walking) that was completed with a Grade 9 boys PE class from an adjoining gymnasium. A group stretch and some push-ups and sit-ups were then performed in a consistent routine. The two classes were then divided and a soccer lesson was implemented based around the progressive template of skill game, skill development, modified game (skill application), and debrief/review of the skills and concepts learned. For example, the soccer unit began with a lesson that developed the skills of dribbling and passing followed by participation in a fitness relay and variety of progressive activities to further enhance these skills. A mini modified game of soccer was the final stage of the lesson, during which students applied their learned skills. The evaluation criteria utilized for the soccer unit were based in two areas of the provincial Healthy Active Living Education curriculum (Ontario Ministry of Education and Training, 1998): knowledge and understanding (a unit test based on the content learned throughout the unit) and application (a daily mark out of 4 based on preparation, effort, and applying knowledge). Marisa described the assessment of students in soccer as being more heavily weighted toward their effort as opposed to their ability.

The fitness testing classes were from 13:00–14:20 (Jessica; n = 13) and from 10:55–12:05 (Patti; n = 20), and both had a Grade 10 boys PE class in an adjoining gymnasium with no shared experiences. Jessica's and Patti's class routines began with a cardiovascular and muscular warm-up that included but was not limited to squats,

jumping jacks, skipping, a dance routine, and then the completion of one or two fitness assessment tasks by each student (e.g., sit-ups, push-ups, long jump, flexibility, and "beep" cardiovascular). Students were given one trial to complete the task, with the choice of a retrial if desired. Students' scores were based against a standardized score chart to judge their performance and progress over the year. For example, the chart divided each assessment into performance quantities with a corresponding rating ranging from 1–5 (1 = *needs improvement*; 5 = *excellent*; e.g., to achieve an excellent standing in the sit-up test, individuals had to complete 54 or more sit-ups in 1 min). Scores for each assessment were summed and averaged to produce students' overall fitness performance, which was used as a part of their overall unit and course mark. Compared to Patti, Jessica placed slightly more emphasis on students' improvement between the first two testing units and the final testing unit.

Measures

Demographics. Students reported individual characteristics such as age, ethnicity, student ID number (for identification purposes), and past academic average in PE by completing a short (2 min) demographic questionnaire.

Enjoyment. We assessed state enjoyment using a shortened version of the Physical Activity Enjoyment Scale (S-PACES) that has been used in a variety of settings and with a variety of ages to measure physical activity enjoyment among adolescent females in PE (Motl et al., 2001). The measure has adequate factorial and predictive validity, alpha coefficients ranging from .77 to .96, and invariance across time (Dishman et al., 2005; Motl et al., 2001). The S-PACES consists of 16 statements (nine positive items and seven negative items) that are scored on a 5-point Likert scale ranging from 1 (*disagree strongly*) to 5 (*agree strongly*). For this study, we excluded the positively worded statements to increase the scale's factorial validity and reduce participant burden, as described by Motl et al. (2001). In other words, we used the mean of students' ratings on the seven negatively worded items, with the stem of each being "Currently, in this Fitness Testing/Soccer unit …," and a sample item is "It's no fun at all."

State anxiety. To assess state anxiety, we used a shortened (six-item) form of the Spielberger State-Trait Anxiety Inventory (STAI-6; Marteau & Bekker, 1992). Previous uses have demonstrat-

ed acceptable validity and internal consistency coefficients of greater than .90 (Kvaal, Ulstein, Nordhus, & Engedal, 2005). We used the mean of the six-item scale because items were rated on a 4-point Likert scale ranging from 1 (*not at all*) to 4 (*very much*). Sample items include "I feel upset" and "I am relaxed."

Social physique anxiety. We assessed SPA from the nine-item Situational Social Physique Anxiety Scale (Martin, Rejeski, Leary, McAuley, & Bane, 1997), which is a shortened version of the original 12-item Social Physique Anxiety Scale (Hart et al., 1989). Previous uses (e.g., Kruisselbrink, Dodge, Swanburg, & MacLeod, 2004; Martin et al., 1997) of the measure revealed satisfactory levels of internal consistency (.88–.90), test–retest reliability (.82), and construct validity, and minimal social desirability bias. We used the mean of the nine-item scale because each item was scored on 5-point Likert scale ranging from 1 (*disagree strongly*) to 5 (*agree strongly*). A sample item is "When it comes to displaying my physique/figure in this Fitness Testing/Soccer Unit of PE class, I feel shy."

Self-efficacy. We assessed self-efficacy using the four self-efficacy for performance items of the Motivated Strategies for Learning Questionnaire, which has demonstrated robust validity and reliability internationally (Duncan & McKeachie, 2005) and in PE settings (Lodewyk et al., 2009). Participants rated each item on a 7-point scale ranging from 1 (*not at all true of me*) to 7 (*very true of me*). A sample item for use in this study is "I'm expecting to do well in this fitness testing/soccer unit in PE."

Attributions. Following previous protocol (e.g., Baron & Downey, 2007; Weiss et al., 1990), we assessed students' causal attributions with the Modified Causal Dimension Scale, which reflects the extent to which students attribute their performance outcomes to factors that are internal or external, stable or unstable, and controllable or uncontrollable. First, students rated their performance success in their respective (e.g., soccer and fitness testing) unit on a 5-point Likert scale ranging from 1 (*not good at all*) to 5 (*very good*). Second, they completed an open-ended attribution item to indicate what they perceived to be the cause of their performance ("The most important reason for why I rated myself this way is . . ."), which serves to also prompt students to reason specifically about their causal attributions. Third, a structured alternative format was used

whereby students categorized each of the four attributions into one of two options: "This reason is because of me" or "This reason is not because of me" (e.g., for the locus of causality attribution). Finally, students selected the degree of truth that the causal dimension holds and rated it on a 4-point scale ranging from 1 (*sort of true*) to 4 (*really true*). Values for each of these attributions were then converted to an 8-point scale (1 = *least advantageous* to 8 = *most advantageous*) based on their responses to their chosen alternative. In other words, to reflect the strength of each attribution, we reverse-coded scores for the less advantageous alternative ("This reason is not because of me"; 4 = 1, 3 = 2, 2 = 3, 1 = 4), and we transformed scores for the more advantageous alternative ("This reason is because of me") to corresponding values from 5 to 8 (1 = 5, 2 = 6, 3 = 7, 4 = 8).

Qualitative item. A single open-ended question was included at the end of each questionnaire. The authors constructed it and adapted it to meet the suggestions that the pilot study participants made. We used this question to gain a better understanding of the female adolescents' perspectives regarding factors that influence and/or relate to their emotions in their current PE class. The students were reminded to write things that were affecting them in the current moment. The question was, "Please explain the main factors in this fitness testing/soccer unit that are affecting your current feelings (environmental, social, physical, etc.)."

Data Analysis

The Statistical Program for the Social Sciences (SPSS 21.0) was used for the statistical analyses in this study. Descriptive, bivariate correlation, multiple analysis of variance (Pillai's Trace), and multiple regression analysis were computed to answer the research questions quantitatively. For qualitative coding and analysis of students' responses to the open-ended survey item, in which students reported unit-specific factors related to their feelings, we used Creswell's (2007) layered approach of content analysis—thoroughly analyzing the data through multiple examinations (levels) with increased delving and interpretation at each new level. Content analysis is the process of identifying, coding, and categorizing primary patterns and themes within the data. Following the verbatim typing of each student's response, the second author categorized each student's responses into positive or negative emotions relative to either soccer or

fitness testing. The second author then further coded the categorized data into major patterns. For example, a theme within the negative emotions category for fitness testing was embarrassment, which appeared to coincide with students' perceptions of low skill level and students' concerns of being observed by others. For coder bias control and validation of the data analysis, a portion of the data was coded independently by a graduate student researcher from another related department following a review of the second author's initial coding scale and subsequent themed categories. Consistent coding practices were determined, with 92.1% of the coding themes being matched. Both individuals discussed discrepancies in the coding until they came to a mutual agreement.

Results

Quantitative Unit Differences

Analysis of the descriptive statistics revealed no abnormal distributions, and scale internal consistency reliability coefficients by unit and assessment time were satisfactory (< .70) except for Assessment Time 1 for state anxiety in soccer (.57) and fitness testing (.41). Assessment Time 1 was therefore deleted for this scale, rendering it the mean of only Assessment Times 2 and 3 (see Table 1). Two cases with excessive Mahalanobis distance (> 20.27 for $\alpha^2 = .005$) were deleted, reducing the sample size from 68 to 66. Analysis of the percentages of students within each unit to make functional attributions (choosing the more advantageous structured alternative on the four causal attributions) revealed that most of the students held functional attributions for personal control (83% soccer; 93% fitness testing), instability (66% soccer; 100% fitness testing), causality (69% soccer; 97% fitness testing), and internal control (55% soccer; 66% fitness testing).

Significant relations were not evident between any attributions and the emotion or belief constructs in either unit, although numerous significant ($p < .05$) bivariate correlations occurred between emotions, beliefs, and unit performance ratings within and across units (see Table 2). First, between fitness testing and soccer, significant relations were evident among state anxiety and SPA ($r = .68, .51$), enjoyment ($r = -.58, -.37$), and self-efficacy ($r = -.72, -.41$); between enjoyment and self-efficacy ($r = .50, .47$); and between unit perfor-

mance ratings and both state anxiety (r = -.54, -.55) and self-efficacy (r = .48, .60). Meanwhile, statistical relations in only fitness testing were between SPA and enjoyment (r = -.61) and between SPA and self-efficacy (r = -.42), and associations unique to soccer were between performance ratings and both enjoyment (r = .45) and stability attribution (r = -.47).

Table 1

Descriptive Statistics by Assessment Time and Unit

	Assessment time							
	Soccer				Fitness testing			
Measure	**1**	**2**	**3**	***M***	**1**	**2**	**3**	***M***
State Anxiety								
α	-	.70	.85	.78	-	.78	.87	.82
M_{AP}	-	1.53	1.47	1.51	-	1.51	1.75	1.60
SD	-	.47	.57	.43	-	.44	.73	.38
Enjoyment								
α	.77	.87	.88	.95	.83	.93	.93	.90
M_{AP}	4.19	4.15	4.11	4.15	4.12	4.18	4.15	4.15
SD	.62	.60	.71	.58	.69	.86	.94	.78
Social Physique Anxiety								
α	.87	.88	.89	.88	.89	.90	.81	.87
M_{AP}	2.25	2.29	2.13	2.23	2.55	2.57	2.60	2.58
SD	.80	.79	.76	.70	.84	.83	.82	.79
Self-Efficacy								
α	.82	.91	.93	.89	.79	.82	.87	.83
M_{AP}	5.70	5.36	5.57	5.55	5.66	5.45	5.47	5.53
SD	1.01	1.34	1.31	1.14	1.01	1.10	1.29	1.06
Attributions				***M* (*SD*)**				***M* (*SD*)**
PCA				6.28 (2.49)				6.66 (1.59)
STA				5.07 (2.88)				6.79 (.90)
LCA				5.52 (2.84)				7.03 (1.21)
ICA				4.55 (2.73)				5.34 (2.29)

Note. n = 35 (Soccer); n = 31 (Fitness Testing). α = alpha internal consistency reliability coefficient; M_{AP} = assessment point mean; PCA = personal control attribution; STA = stability attribution; LCA = locus of causality attribution; ICA = internal control attribution.

Table 2
Bivariate (Pearson) Correlations

Scales	SA	ENJ	SPA	SE	PCA	STA	LCA	ICA	PR
SA	-	-.58**	.68**	-.72**	.01	-.17	.05	.06	-.54**
ENJ	-.37*	-	-.61**	.50**	-.04	.07	-.16	.15	.34
SPA	.51**	-.19	-	-.42*	-.05	.12	.07	.08	-.31
SE	-.41*	.47**	.06	-	.06	.30	-.03	-.16	.48**
PCA	-.26	.004	-.23	-.09	-	.32	.38*	-.33	.23
STA	.22	-.35	.11	-.19	.22	-	.14	-.31	.10
LCA	-.02	-.09	-.25	-.05	-.16	-.04	-	-.25	.006
ICA	.04	-.11	.03	-.27	.32	.55**	.03	-	-.06
PR	-.55**	.45*	-.11	.60**	.20	-.47*	.06	-.36	-

Notes. Correlations for soccer are below the diagonal and those for fitness testing are above the diagonal. SA = state anxiety; ENJ = enjoyment; SPA = social physique anxiety; SE = self-efficacy; PCA = personal control attribution; STA = stability attribution; LCA = locus of causality attribution; ICA = internal control attribution; PR = students' ratings of unit performance.

*$p < .05$. **$p < .01$.

Results of an ANOVA revealed no significant differences in students' unit performance ratings between units ($p = .87$). To discover the predictive strength of each emotion (anxiety, enjoyment, SPA) and belief (self-efficacy, attributions) on students' ratings of unit performance, we performed two multiple regression analyses ($p < .05$; one for each unit). Soccer performance ratings were predicted by emotions and beliefs, $R^2 = .63$, $F(8, 20) = 4.24$, $p = .004$, with self-efficacy emerging as the sole predictor of unit performance in soccer ($t = 2.15$, $p = .04$). Emotions and beliefs did not predict performance ratings in fitness testing, $R^2 = .40$, $F(8, 20) = 1.63$, $p = .18$.

To control for the effect of teacher variance by unit, we used a preliminary multiple analysis of variance test to analyze teacher differences in self-efficacy, attributions, the three emotions, and beliefs, and this revealed no main effect ($p = .057$). The same analysis for differences by unit revealed a main effect, $F(8, 49) = 3.51$, $p = .003$, ES = .36, with significantly higher levels of state anxiety, $F(1, 56) = 4.27$, $p = .04$, ES = .07; SPA, $F(1, 56) = 7.66$, $p = .008$, ES = .12; and attributions that something can be changed (is not stable), $F(1, 56) = 9.48$, $p = .003$, ES = .15, and that it is personally

(because of me) causal, $F(1, 56) = 7.02$, $p = .01$, ES = .11, in fitness testing than in soccer. No between-unit differences were found in enjoyment ($p = .82$), self-efficacy ($p = .96$), personal control attribution ($p = .49$), or external control attribution ($p = .24$).

Qualitative Unit Differences

Results of the qualitative data analysis of within-unit variation in emotion and self-efficacy revealed prominent fitness testing unit themes of social evaluations, body image, and internal motivation. Soccer unit themes were security, social interaction, and internal motivation. We then conducted an in-depth analysis of these theme sets to analyze the variation in emotion and self-efficacy between the fitness testing and soccer units. More specifically, negative social evaluation factors were prominent in both units, as evidenced by students' emotions being affected by the presence, thoughts, and perceptions of others.

Students in the soccer unit highlighted the role of positive social interactions and relationships on their emotions more than those in the fitness testing unit did. To illustrate, one student commented, "Sometimes I feel like some of the girls judge me. Also, when Grade 10 boys watch they openly mock us and it sucks." The following are sample positive comments in soccer: "My feelings during this unit are social because you can be partners with new people you don't usually talk to and happy because you are with friends and energetic because you are constantly moving" and "I think the social factor of playing soccer makes it more fun because we're not all good at it and we joke around with each other."

Although the role of physical comfort on students' feelings was a prominent theme in both units, students in the fitness testing unit appeared noticeably more apprehensive about their physical appearance (i.e., athletic physique) and fitness level, whereas students in the soccer unit focused more on perceived ability, social comparison, and assessment of skills. Two sample comments in fitness testing follow: "Maybe it is that I am not comfortable with my body and I think other people will judge me and make fun of me and that would make me feel worse" and

> The main factors that are affecting my feelings are my weight and how everyone else is so like small and skinny. I feel bad during fitness testing if someone gets a better mark than me. I feel like they got it because they are skinnier than me.

Between the two units, differences in emotions were evident in students' motivational influences. Students in the fitness testing unit reported more reliance on self-motivation and challenge to improve their scores, whereas students in the soccer unit were more motivated by socialization with friends while playing. For example, one girl discussed her fitness testing motivations: "The main factor I think about is that I can do better than the last time and hopefully I became stronger." But another participant's dislike of fitness testing is evident: "I dislike running; it's boring and annoying. I am not a good athlete, so I feel uncomfortable amongst good runners and athletes." Negative motivational comments from the soccer unit were focused on boredom (particularly in relation to skill development drills) and a lack of self-efficacy, such as "Passing the ball back and forth bores me…." and "When I play I feel happy, but sometimes like I am not good enough; therefore, I tend to worry and be a little shy on how well I play."

In regard to self-efficacy, improvement was a prominent factor in the fitness testing unit compared to a focus on participation in the soccer unit. To illustrate, in the fitness testing units, students reported personal achievement ("higher mark/bad"), improvement ("improving/dropping"), and satisfaction ("I'm happy with my overall score/disappointed") in the pursuit of personal goals. For example, one girl stated,

> I have to do the beep test today and I haven't done that in a while. I have to beat my score from last time, but because I haven't been exercising as much as I used to I might not get a higher score.

In comparison, students' self-efficacy in the soccer unit seemed more aligned with their actual achievement than with their improvement. This is reflected in these statements: "I find as long as you run for the ball you get good marks for effort" and "…It's easy to get good marks

and it's not difficult to understand soccer concepts or have fun while playing it."

Finally, students had positive and negative feelings relative to each unit. Positive feelings toward the fitness testing unit were evident in a lower number of student comments (n = 20) than those expressing negative feelings (n = 41; 67%). Here is an example of a positive feeling in fitness testing: "I am confident in everything I do. I know I do my best and that's all I can do. If people aren't happy with it, then that's too bad because I tried." Terms such as "judgment," "athletic figure," "failure," "awkward," "uncomfortable," "watching," "anxiety," "hate," and "nervous/scared" were common in the fitness testing unit, reflecting a prominent student concern to avoid embarrassment stemming from low perceived skill level and from social observations. This is illustrated in this statement: "When I hear we are doing fitness testing I want to give up because Grade 10 and 11 boys are watching us … they mock us. It's scary." Conversely, in soccer, positive responses made up a majority (n = 60; 79%) of the students' comments. Associated terms were "fun," "play," "energized," "good," "friends," "happy," "comfortable," "enjoyment," "environment," and "supportive," reflecting a theme of comfortable active social play. For example, one student said, "Good time playing with peers … even though I'm not the greatest soccer player so that made me a bit shy/tense… having good friends around me allowed me to be calmer." Less than a third of the responses (n = 16) pertaining to the soccer unit were negative, and these tended to focus on the feeling of embarrassment stemming from social judgments of individual ability, which was evident in terms such as "evaluation," "athletic ability," and "boredom." One girl described her physical inability as an influential factor of her embarrassment: "When I play soccer, I feel that people judge me because I am not good."

Summary

In summary, the unit-specific validity of state anxiety, SPA, self-efficacy, and enjoyment was reinforced through bivariate correlations and internal consistency. First, correlations were similar within the soccer and fitness testing units, with the exception of SPA being related to self-efficacy and enjoyment only in fitness testing and performance ratings being associated with enjoyment and a sta-

bility attribution only in soccer. Further, although students generally had functional attributions in both units, none of the four attributions related to the three emotions or two beliefs in either unit. Second, these emotions and beliefs collectively predicted soccer but not fitness testing unit performance ratings, with self-efficacy being the sole predictor in soccer. Third, with no main effect for teacher difference in emotions and beliefs, there was a main difference by unit; specifically, there were statistically higher levels of state anxiety, SPA, and two attributions (that something can be changed/is not stable, that something is personally causal/because of me) in fitness testing.

Qualitatively, there were similarities across units about why students felt certain emotions, with social evaluation concerns, physical comfort, and internal motivation emerging as themes in both units. Relative to unit, students in fitness testing reported notably more apprehension about their physical appearance (i.e., athletic physique) and fitness level, whereas students in soccer were more concerned with the lack of perceived ability, social comparisons, and assessment of skills. Students were notably more reliant on self-motivation and challenge to improve their personal goals in fitness testing compared to the greater focus on socialization with friends while playing in soccer. Finally, there were proportionally more negative comments about fitness testing than about soccer.

Discussion

This study provides fresh insight into unit-specific (soccer and fitness testing) differences in high school female PE students' emotions (state anxiety, enjoyment, and SPA) and beliefs (attributions and self-efficacy) and how each predicts students' performance ratings. The study revealed that positive and negative emotions are manifest in soccer and fitness testing units during PE. With the exception of SPA, which seems more pronounced in fitness testing, relations among students' emotions, self-efficacy, and attributions were similar in soccer and fitness testing, as were some of the reasons students provided for why they experienced certain emotions (social evaluation concerns, physical comfort, and internal motivation).

Despite these similarities across units, the study also revealed noteworthy differences in girls' emotions and beliefs within units. In soccer, emotions and beliefs (especially self-efficacy) predicted

performance ratings and students reported more socialization with friends. Student concerns in soccer also centered on their perceived lack of ability, potentially negative social comparisons, and uncertainty as to how their skills would be assessed. Meanwhile, in fitness testing, SPA was negatively related to self-efficacy and enjoyment. Further, performance ratings were associated with enjoyment and a stability attribution; there were higher levels of state anxiety, SPA, and positive attributions of performance to being personally alterable. Students in the fitness testing unit were also more reliant on self-motivation and challenge to improve their personal goals, and they were notably more apprehensive about the unit overall and about their physical appearance (i.e., athletic physique) and fitness level.

The generally heightened potential for state anxiety and SPA and the higher levels of negative comments relative to fitness testing may reflect research reporting the negative emotionality in some contexts of fitness testing in PE wherein assessments, physical performance, and a more "ideal" physique are relatively salient (Cale & Harris, 2009). For example, studies have associated SPA with settings that emphasize appearance such as body figure and tight clothing (Eklund & Crawford, 1994).

Pubescent females may be particularly at risk; they have been associated with greater peer comparisons and experience more pressure to be thin, attractive, and accepted compared to males and females of other ages, potentially leading to decreased interest in and avoidance of PE activities (Hart et al., 1989; Lodewyk et al., 2009). Implications for physical activity are clear, yet the individuals most in need of exercise tend to be the least likely to involve themselves in it when they perceive they will be negatively evaluated by others (Ridgers et al., 2007). This study adds to this research by showing that the influence of SPA and state anxiety on self-efficacy and enjoyment may be more poignant in fitness testing than in games units such as soccer. More research using experimental research designs or structural equation modeling statistical analyses are needed to more conclusively ascertain this.

Another noteworthy finding of this study was that the majority of students gave functional attributions for their unit performances, although their attributions did not relate statistically to state or SPA,

enjoyment, self-efficacy, or unit performance ratings. This absence of association was somewhat novel compared to that in previous attribution research in movement settings (e.g., Baron & Downey, 2007; Chase, 2010; Weiss et al., 1990), which prompted our expectation of higher levels of enjoyment and self-efficacy and lower levels of anxiety and SPA when the outcome of unit performance was attributed to internal, stable, and controllable reasons. Baron and Downey (2007) noted that "causal attributions are situation-specific and may be influenced by the nature of the task" (p. 16), so attributions may have related less to state anxiety, enjoyment, SPA, and self-efficacy among females in the particular soccer and fitness testing settings in this study. Future studies are needed to confirm this in other instructional, pedagogical, and demographic contexts in PE because varied settings may uniquely prompt variance in attributions and emotions such as anxiety through, for example, student differences in perceived control, interest in the subject matter, ability, and the motivational climate (Liukkonen, 2007; Weiner, 2005).

In this study, advantageous attributions (that something can be changed and is personally causal) were higher in fitness testing. Qualitative concerns about socialization and assessment were higher in soccer, which contradicts Baron and Downey's (2007) finding of no differences in attributions between games, dance, and gymnastics for students in elementary school PE. Thus, our finding that emotions and beliefs (notably self-efficacy) predicted unit performance ratings in soccer and not fitness testing, and the significant interactions between SPA, self-efficacy, and enjoyment in fitness testing compared to soccer collectively provide new insight into how soccer and fitness testing might uniquely stimulate emotions and beliefs in adolescent females. The higher dependence on physiological and genetic capability for performance success in fitness testing (Harris, 2005), compared to soccer (in which assessment may be perceived as more ambiguous, assessment is centered around collaborative teamwork, and self-efficacy is perhaps connected to subsequent performance), may explain the presence of more advantageous attributions reported in the fitness testing unit. In other words, students may perceive that fitness testing has clearer performance criteria (i.e., standards) from which they can calibrate their self-efficacy and potential achievement (e.g., attitude, physical and tactical skills). Researchers

have reported, for example, that learners are able to infer future performance success and/or failure under similar circumstances when attributions of their current performance are based on stable factors (Weiner, 2005).

Based on this study and relevant research evidence, we suggest that teachers be aware of the particular vulnerability of adolescent females in certain game and fitness testing settings and intervene pedagogically when necessary. For example, in fitness testing it may be useful to decrease students' levels of embarrassment and anxiety as well as to increase their enjoyment, effort, and motivation. Silverman et al. (2008) and Wiersma and Sherman (2008) suggest that students clearly comprehend the requirements of each test item, have adequate time to practice for it before the actual testing session, and understand the importance of testing and what their test results mean in regard to their health level.

Further, PE teachers can de-emphasize normative performance results (especially publically) and peer judgments, rotate students through test stations in small groups, enable students to wear appropriate attire that they deem comfortable, and emphasize skill mastery, positive feedback, and improvement through setting and monitoring personal fitness goals. Meanwhile, it may be useful for teachers of soccer lessons to focus on internal improvement, self-referenced (vs. group) competition and progress, and to provide choices and clear and consistent expectations and assessment practices so students can more accurately calibrate and attribute their performance. These are some ways that might help female adolescents feel more confident and less anxious and physically vulnerable in PE with positive implications on their participation in PE and physical activity.

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PEDAGOGY

Measuring Preservice Teachers' Knowledge of Instructional Tasks for Teaching Elementary Content

Insook Kim and Bomna Ko

Abstract

Purpose: *The purpose of this study was to measure preservice teachers' knowledge of instructional tasks for teaching three manipulative skills in elementary physical education.* ***Method:*** *Data were collected to measure preservice teachers' entry and exit knowledge of instructional tasks that require selecting developmentally and sequentially appropriate content for elementary students. Preservice teachers from four PETE programs in the United States participated. Descriptive statistics were used to report the data.* ***Findings:*** *The results of this study showed that (a) preservice teachers' entry and exit levels of task knowledge for teaching elementary content were insufficient and varied across programs and (b) the improvement in task knowledge from entry to exit of the elementary content courses was small.* ***Conclusion:*** *The results challenge the current methods for teaching elementary content in PETE programs. Several research-driven strategies are suggested for promoting preservice teachers' knowledge of instructional tasks.*

Teachers' knowledge of instructional tasks and their ability to select developmentally appropriate tasks and sequence them in meaningful ways have been recognized as critical skills for teachers (Ball, Thames, & Phelps, 2008; Krauss et al., 2008; Rink, 2009; Siedentop

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& Tannehill, 2000; Ward, 2013). Given that students achieve more learning outcomes in high-quality tasks than in low-quality tasks in physical education lessons, the quality of teachers' instructional tasks should be examined in determining in-depth understanding of content (Ward, 2013).

To design quality instructional tasks, teachers require two distinct forms of content knowledge in physical education (Ward, 2009), derived from the work of Ball et al. (2008) in mathematics. Common content knowledge (CCK) is the knowledge that a teacher needs to perform the activity including knowledge of game rules, safety, etiquette, techniques, and tactics in physical education (Ward, 2009). On the other hand, specialized content knowledge (SCK) is the unique knowledge that a teacher needs to teach the content to students including knowledge of common errors, error corrections, and instructional tasks (Ward, 2009). These forms of content knowledge are distinguished from other teacher knowledge bases such as pedagogical content knowledge (PCK), "a focal point, a locus, defined as contextually specific event in time where teachers decide contents according to their understanding of other knowledge bases (e.g., knowledge of curriculum, pedagogy, student, and context)" (Ward, Kim, Ko, & Li, 2015, p. 2). For example, a teacher's ability to list critical elements of a kicking skill can be identified as CCK, whereas a teacher's ability to list common mistakes that students make or to sequence the instructional tasks appropriately from static tasks (e.g., kicking to wall) to dynamic tasks (e.g., 2 vs. 1 pass) can be identified as SCK. In particular, a teacher's ability to select, represent, or adapt the content appropriately for specific learners (e.g., fourth grade students who had at least two previous instructional units of soccer) using other knowledge bases (e.g., knowledge of students, context, curriculum, and pedagogy) can be identified as PCK.

Researchers have reported that teachers who have strong content knowledge use more instructional tasks than do teachers with weaker content knowledge (Ayvazo & Ward, 2011; Gusthart, Kelly, & Rink, 1997; Hastie & Vlaisavljevic, 1999; Kim, 2015). Recently, several researchers have used experimental studies to examine changes in teachers' use of instructional tasks and concomitant changes in student learning as a result of changes in teachers' SCK (Iserbyt, Ward, & Martens, 2015; Kim, 2015; Sinelnikov, Kim, Ward, & Li, 2015;

Ward, Kim, et al., 2015). These studies showed change in the teachers' use of extending and refining instructional tasks. In addition, the results of the studies indicated that teachers who improved their SCK selected more developmentally appropriate tasks and presented the tasks to students in more depth. This area of research focused on in-service teachers' SCK, knowledge of instructional tasks. No existing research examines the role of SCK and preservice teachers' SCK. Therefore, little is known about how much in-depth content knowledge that preservice teachers have prior to content coursework and how much they acquire by the conclusion of their content coursework in physical education teacher education (PETE) programs.

Measurement of content knowledge has relied on Rink's (1985) content development categories: (a) an informing task that is the initial task in a sequence of learning tasks, (b) an extending task that is the modified task for increasing or decreasing the difficulty or complexity of performance, (c) a refining task that is intended to improve the technical quality of a skill or strategy performance without changing the practice conditions, and (d) an applying task that is intended to provide students with the chance to apply their skills and use strategies in more authentic ways. Rink's categories provide clear distinctions among content. Barrett, Sebren, and Sheehan (1991) used written lesson plans to measure how the teaching content was developed through changes to content development patterns over 2 years (i.e., methods course, student teaching, and first-year teaching). The format of written lesson plans included instructional tasks, organizational procedures and patterns, and major emphases. More recently, Ward, Lehwald, and Lee (2015) suggested a content map that illustrates sequential and interconnected tasks using Rink's content development categories as a way to measure knowledge of instructional tasks for teaching a specific content area in PETE. The authors used the content map as an alteration of a concept map that has been used in other subjects, considering that both are designed to represent relationships among concepts to be learned. However, a content map is distinguished from a concept map, emphasizing the analysis of instructional tasks that teach the concepts (Ward, Lehwald, & Lee, 2015). To create a content map, these tasks must be completed in sequence: (1) listing the major skills that would be taught in a 10-day instructional unit along the bottom of the tem-

plate, (2) listing the sequenced tasks that would be used to teach each of the listed skills in brief, and (3) connecting the listed tasks if they are not discrete by drawing lines that link them (Ward, Lehwald, & Lee, 2015). The authors argued that the content map defines the SCK to be taught and its relationship to other SCK.

The purpose of this study was to determine the usefulness of a content development measurement tool to assess preservice teachers' knowledge of instructional tasks. The measurement tool required preservice teachers to complete four tasks that allow a score reflecting the depth of content knowledge to be reported. The strategy was to compare pre- and postmeasurement scores on preservice teachers' instructional task knowledge for teaching three commonly taught manipulative skills before and after their engagement in elementary physical education content courses. The specific research questions of the study were as follows: (a) How does preservice teachers' knowledge of instructional tasks differ between pre- and postmeasurements across the task categories? (b) How does preservice teachers' ability to list developmentally and sequentially appropriate tasks differ between pre- and postmeasurements across the programs?

Method

The study was approved by the university institutional review board. Signed informed consent was obtained from all participants. A descriptive–analytic research design was utilized for collecting, analyzing, and interpreting data for this study.

Participants

To recruit potential participants in the study, we contacted via e-mail more than 10 teacher educators who taught elementary content courses in the United States at PETE programs with established reputations. Five faculty members in four programs agreed to participate (i.e., one instructor from each institution in the states of California, Tennessee, and Ohio and two instructors from the same institution in the state of North Carolina who taught the same course with rotation over 2 years). The instructors had a mean of 8.6 years (range = 3–25) of experience in teaching elementary content courses in PETE. Each instructor explained the research to their students who were taking elementary content courses and asked for

their consent to participate in the study. Eighty-one PETE students (11–25/site) from sophomores to seniors agreed to participate in this study. From this pool, we randomly sampled data from 55 participants, with equal sample sizes (n = 11/site).

Data Collection

We measured knowledge of instructional tasks that inform SCK using an instructional task assessment form. The participants enrolled in the elementary content courses completed the form at the beginning and end of the elementary content courses during a class meeting. The form took 40–50 min to complete.

Instructional Task Assessment Form

To examine the depth of their instructional task knowledge, we requested that the participants complete four tasks. First, the participants listed as many skill-relevant instructional tasks as possible that they would use to teach three manipulative skills (e.g., throwing/catching, volleying, and kicking). Second, the participants wrote clear individual task statements by including three components: (a) what to do - content, (b) where to do - context, and (c) how well to do - criteria. This was done to clarify the task intentions. Third, the participants listed the tasks they had written for each manipulative skill in what they considered to be the appropriate sequence ranging from simple (easy) to complex (difficult). Finally, the participants used their best judgment relative to what grade level they might begin teaching each instructional task. These tasks have been commonly used in teacher education in the past (e.g., French et al., 1991; Rikard, 1991, 1992; Siedentop & Tannehill, 2000; Silverman, Subramaniam, & Woods, 1998; Silverman, Woods, & Subramaniam, 1998; Werner & Rink, 1989).

Data Coding

Before starting to code data, we determined whether the individual statements were appropriately stated for the analyses. If an individual statement was in one of three cases—(a) no description of learning activity but merely listing the critical elements of the skill, (b) not relevant to teaching the designated skill (e.g., rolling a ball to hit standing targets for throwing), or (c) too brief task description that hindered correct judgment (e.g., throwing the ball or kicking

the ball)—it was excluded from further examination. On 21 occasions we excluded the statements from the entire data set. After that, each individual task statement was coded using two task categories: (a) developmentally appropriate selection and (b) sequentially appropriate progression.

First, we examined the participants' individual task statements for their developmental task appropriateness. For example, if a written task statement was developmentally appropriate for a designated target grade (e.g., throwing at a wall target 10 ft away from the wall for second graders or tapping the stationary ball on the personal space for first graders), it was coded as appropriate. If a written task statement was developmentally inappropriate for a designated target grade (e.g., passing game in 3 vs. 3 for first graders or throwing the ball at wall targets for fifth graders), it was coded as inappropriate.

Second, the individual task statements were further examined for their sequentially appropriate task progressions. For example, if a written task statement was appropriately progressed from the prior task (e.g., from simple to complex, from easy to difficult, or from static to dynamic), it was coded as appropriate. If a written task statement was inappropriately progressed from the prior task (e.g., volleying on a move and then volleying on the personal space or passing game in 2 vs. 2 and then passing game in 1 vs. 1), it was coded as inappropriate.

Finally, it was determined whether the individual task statements were only developmentally appropriate, only sequentially appropriate, developmentally and sequentially appropriate, or developmentally and sequentially inappropriate based on the previously determined individual task statements in each developmentally appropriate and sequentially appropriate category.

Coder Training

Two coders were trained for 3 hr over 2 days. The procedures for training were organized into three phases. In the first phase, the coders learned the definitions of the coding variables (e.g., content relevancy, developmental appropriateness, and sequential appropriateness), receiving the sample responses of skill-relevant/irrelevant, developmentally appropriate/inappropriate, and sequentially appropriate/inappropriate task statements. Their understanding was

evaluated through a verbal test with a criterion (i.e., 90% correct responses).

In the second phase, the coders practiced coding with the investigators using the developed coding template and three instructional task assessment forms that were randomly selected from the entire data set. If there were incorrect observations, the investigators delivered corrective feedback.

In the third phase, the coders used the developed coding template to individually code another five instructional task forms that were randomly selected from the remaining data set. Coder training was continued until they reached 100% agreement with the investigators' coding.

Interobserver Agreement

After the completion of coder training, interobserver agreement (IOA) was conducted on 33% of the collected pre- and postmeasurement forms (i.e., 36 of 110). IOA was computed by the following formula: [Number of Agreements / (Number of Agreements + Disagreements)] × 100. The mean for the IOA data was 91.3%, which meets the 85% criterion suggested by Cooper, Heron, and Heward (2007).

Data Analysis

In all, 110 measurement forms were coded. Coding data were tallied and then added up across the three teaching skills in each participants' pre- and postmeasurements. The summed data were descriptively analyzed using SPSS 20.0 statistical software. The means and standard deviations of the instructional tasks listed by the entire programs across the task categories in the pre- and postmeasurements were reported. The mean gains and standard deviations of skill-relevant tasks and both developmentally and sequentially appropriate tasks from pre- to postmeasurements were reported later. In addition, Cohen's *d* effect sizes (Cohen, 1988) were reported to indicate the standardized mean differences among groups.

Results

How Does Preservice Teachers' Knowledge of Instructional Tasks Differ Between Pre- and Postmeasurements Across the Task Categories?

The first research question of the current study was how preservice teachers' knowledge of instructional tasks differs across the task categories before and after taking the elementary content courses. The analysis of the pre- and postmeasurement data indicated that the preservice teachers' stated instructional tasks for teaching the three manipulative skills were insufficient. The premeasurement data showed that the preservice teachers enrolled from all the programs had a mean of 13.2 skill-relevant tasks (SD = 5.9), 5.8 developmentally and sequentially appropriate tasks (SD = 5.0), and 4.0 developmentally and sequentially inappropriate tasks (SD = 4.7) for teaching the three manipulative skills. The postmeasurement data showed that the preservice teachers from all the programs had a mean of 15.2 skill-relevant tasks (SD = 8.0), 8.5 developmentally and sequentially appropriate tasks (SD = 6.6), and 2.9 developmentally and sequentially inappropriate tasks (SD = 3.0) for teaching the three manipulative skills. In both pre- and postmeasurements, on average less than one stated task was observed as only developmentally appropriate and fewer than three listed tasks were only sequentially appropriate from all the programs (see Figure 1).

The results of the mean differences from pre- to postmeasurements in terms of the listed skill-relevant tasks and developmentally and sequentially appropriate tasks showed that the preservice teachers, on average, were able to list more than two skill-relevant tasks (SD = 5.4) and fewer than three developmentally and sequentially appropriate tasks (SD = 4.4) after completing the elementary content courses. However, the values of Cohen's d—skill-relevant tasks (d = .29) and developmentally and sequentially appropriate tasks (d = .45)—indicated a small or medium effect of the elementary content study, which falls behind Cohen's (1988) convention for a medium effect (d = .50).

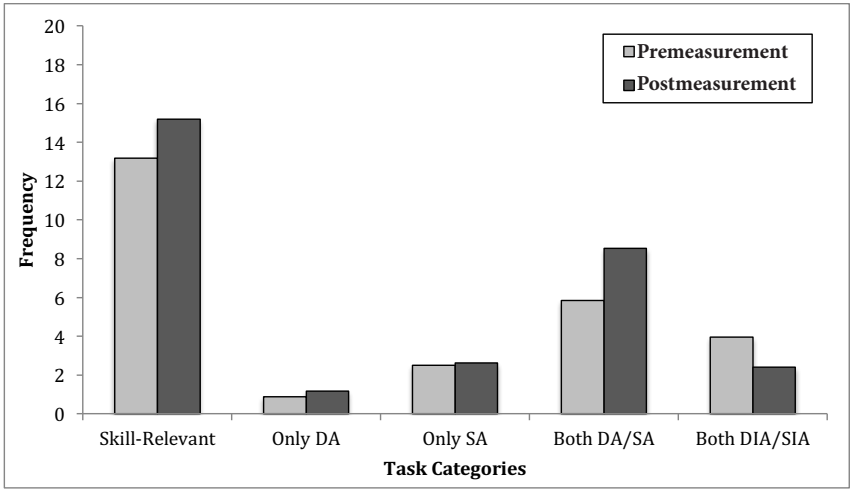

Figure 1. Means of total program pre- and postmeasurements on knowledge of instructional tasks across the task categories.

How Does Preservice Teachers' Ability to List Developmentally and Sequentially Appropriate Tasks Differ Between Pre- and Postmeasurements Across the Programs?

The second research question of the study was how preservice teachers' ability to list developmentally and sequentially appropriate tasks before and after taking the elementary content courses differs across the programs. Data indicated that the preservice teachers' listed instructional tasks that were developmentally and sequentially appropriate for teaching the three manipulative skills were insufficient and varied across the programs. The premeasurement data showed that the preservice teachers in Program 2 (M = 10.1, SD = 6.9) and Program 3 (M = 8.2, SD = 5.4) listed more developmentally and sequentially appropriate tasks for teaching the three manipulative skills than did those in Programs 1-1, 1-2, and 4 (M = 3.0 ~ 4.3, SD = 2.3 ~ 3.0). The postmeasurement data showed that the preservice teachers in Program 1-1 (M = 3.4, SD = 3.7) and Program 1-2 (M = 4.5, SD = 2.6) listed fewer developmentally and sequentially appropriate tasks for teaching the three manipulative skills than did those in Programs 2, 3, and 4 (M = 10.8 ~ 12.9, SD = 4.6 ~ 7.7; see Figure 2).

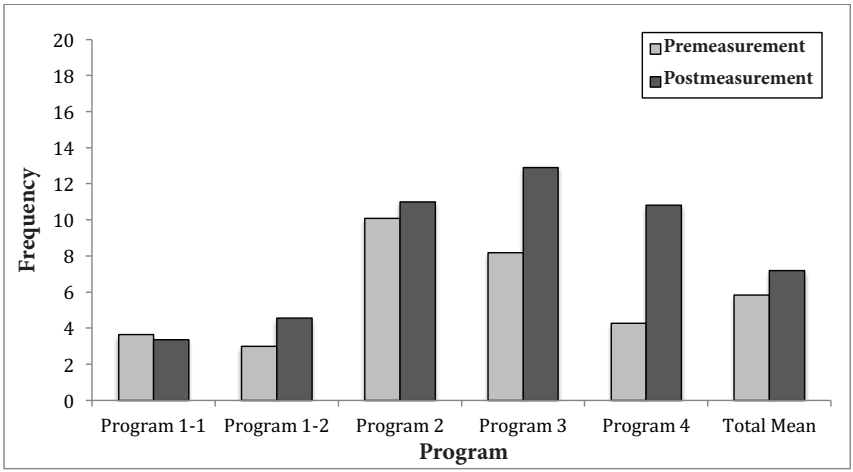

Figure 2. Means in pre- and postmeasurements of developmentally and sequentially appropriate instructional tasks across the PETE programs.

The mean differences between pre- and postmeasurements of the listed instructional tasks that were developmentally and sequentially appropriate varied across the programs. Improvement of preservice teachers' knowledge of instructional tasks in Program 1-1 (d = .09) and Program 2 (d = .12) was rarely observed at the conclusion of the content study, which falls behind Cohen's (1988) convention for a small effect (d = .20). On the other hand, the preservice teachers enrolled in Program 1-2 (d = .63), Program 3 (d = .74), and Program 4 (d = 1.70) showed medium-large effects of the elementary content study, which exceeds Cohen's (1988) convention for a medium effect (d = .50) or a large effect (d = .80).

Discussion

Considering that students in physical education lessons learn better from meaningful learning experiences and appropriate level of task difficulty provided by a teacher who possesses in-depth content knowledge (Rink, 2009; Silverman, 1985; Silverman, Subramaniam, & Woods, 1998), future physical educators should be well prepared for using in-depth content knowledge. A pressing task of teacher education programs is to promote preservice teachers' content knowledge. Yet there are few tools to assess content knowledge. This study presented four tasks that can be used to generate a score with which to judge the depth of content knowledge.

Measuring teachers' content knowledge is essential for planning and teaching, but there has been limited examination of the relationship between teachers' content knowledge and student learning in research on content knowledge (Ward, 2013). From this study, we gained knowledge about the level of content knowledge obtained by preservice teachers when they exit content courses, allowing us to discuss the direction and focus of professional development for preservice teachers. We found that the preservice teachers' initial knowledge of instructional tasks was weak; they listed only one or two developmentally and sequentially appropriate tasks per skill at the beginning of their content study. Siedentop (2002) pointed out preservice teachers' lack of content knowledge at program entry, which hinders students from developing in-depth understanding of content, and argued for intensifying and expanding the amount of content knowledge course requirements in PETE, reporting examples of other subject matters (e.g., art, music, and dance education programs). Additionally, Kim, Lee, Ward, and Li (2015) explained the lack of preservice teachers' content knowledge at program entry as an outcome of their K–12 physical education experiences, noting that few preservice teachers enter the programs with adequate content knowledge in more than one or two sports. In addition, we found that the preservice teachers' initial levels of elementary task knowledge that represents their SCK varied across the programs and the individuals. This result can be explained by the contention that the preservice teachers' performance knowledge (i.e., CCK) and their initial knowledge of instructional tasks (i.e., SCK) were acquired through their prior sport and coaching experiences (Ward, 2009). Most PETE programs in the United States and other countries (e.g., South Korea) have been designed based on the assumption that performance is the pathway to learning to teach physical education (Ward, 2009; Ward, Kim, et al., 2015; Ward, Li, Kim, & Lee, 2012). There are consistent findings related to teacher knowledge in math, science, and physical education that have shown that preservice teachers or beginning teachers' performing experience (i.e., CCK) plays a vital role in the quality of the content selections, sequences, and representations (i.e., SCK; Ball et al., 2008; Sinelnikov et al., 2015; Ward et al., 2012). To ensure that potential physical education teachers have appropriate levels of content knowledge at program

entry in their admission process, PETE educators should consider the relationship between CCK and SCK.

The postmeasurement data showed that the preservice teachers who completed the elementary content course requirements listed, on average, three developmentally and sequentially appropriate tasks per skill. Compared to the mean of 27 developmentally and sequentially appropriate tasks per skill listed by Graham, Holt/Hale, and Parker (2013), this represents a lack of preservice teachers' SCK acquisition at the conclusion of their elementary content study. More surprisingly, some preservice teachers rarely improved knowledge of instructional tasks after completing the elementary content study. Based on the argument of Ball et al. (2008) that CCK and SCK may exist independently, it may be possible for preservice teachers not to know how to teach a fundamental motor skill by selecting developmentally and sequentially appropriate tasks, even though they know how to perform it correctly. Some have argued that preservice teachers' SCK may not develop naturally without having specific learning practices intended to develop SCK during content courses, and they have suggested a focused learning environment for CCK and SCK (Kim, 2015; Kim et al., 2015; Sinelnikov et al., 2015; Ward, 2013).

This study supports the argument that in the absence of focused instruction that emphasizes developing knowledge of instructional tasks, preservice teachers may exit their programs with a lack of potential to mature as content experts (Ball et al., 2008; Kim et al., 2015; Ward et al., 2012). Similarly, Blankenship and Ayers (2010) argued that preservice teachers lack support for developing in-depth content knowledge that includes appropriate content progression, clear content representations, and teaching cues, even though they experienced shallow game play and joy of movement during activity courses in PETE. With large-scale studies in the United States reporting 10% to 15% of lesson time allocated to learning motor skill development at the elementary school levels (McKenzie & Lounsbery, 2013), Dyson (2014) argued that elementary teachers do not have task progressions for skill learning. Additionally, Constantinides, Montalvo, and Silverman (2013) reported that elementary physical education specialists used more skill practice tasks, which results in more student practice trials, when compared with nonspecialists who provided game play in teaching elementary content. Given

that teachers' teaching effectiveness can be differentiated by their use of instructional tasks (Kim, 2015; Pellett & Harrison, 1995; Rikard, 1991; Rink, 2009; Sinelnikov et al., 2015; Ward, Kim, et al., 2015), the focus of professional development programs should be to improve preservice and in-service teachers' knowledge of instructional tasks that inform their in-depth content knowledge acquisition.

To compound the issue regarding preservice teachers' lack of SCK acquisition during content courses, there has been an enduring voice related to the current policy for initial teacher education, with the structures of PETE programs reflecting national and state standards for beginning teachers (Kim et al., 2015; Ward, 2013; Ward, Kim, et al., 2015). Under the National Standards for Initial Physical Teacher Education (National Association for Sport and Physical Education, 2008), which require a teachers' motor skill competence in a variety of activities and movement patterns, many PETE programs have been compelled to teach more CCK rather than SCK (Kim et al., 2015; Ward, 2014). This absence of policy support for SCK fostered a recent policy initiative that emphasizes SCK development in the beginning teacher standards in physical education by SHAPE America. Under the newly proposed policy initiative, PETE programs can initiate or enable curriculum change or reform for promoting SCK. With the view that preservice teachers "will carry PE forward for the next decade or longer" (Pill, 2007, p. 25), PETE programs can therefore actively promote curriculum innovation and change and provide an ideal environment that supports the adoption of new ideas (Macdonald et al., 2002).

With the goal of improving teacher quality and meaningful student learning, physical education teachers face a challenging issue in preparing future physical education teachers well beyond the content standards (Ward, 2013). With an essential concept of "less is more" for improving quality physical education (Rink, 2009), and given that developing in-depth content knowledge takes a great amount of time, effort, and persistence (Dyson, 2014), teachers need initiative actions to make some changes in teacher preparation programs. The University of Michigan elementary teacher education program offers 19 high-leverage teaching practices in which the proficient enactment by a teacher is likely to lead to comparatively large advances in student learning (e.g., group discussion, modeling content/

practices/strategies, coordinating/adjusting instruction, specifying/reinforcing productive student behavior, and designing single lessons/sequencing of lessons; see University of Michigan School of Education, n.d.). In physical education, Ward and his colleagues, who early recognized the importance of preservice teachers' SCK development, suggested several research-driven strategies for developing or measuring SCK: (a) using specific teaching practices that include video performance analysis, repeated peer teaching, scenario-driven instructional problems, freeze replay of teaching episodes, and assessment of SCK knowledge (Ayvazo, Ward, & Sthur, 2010; Kim et al., 2015); (b) using a content knowledge packet that includes the intended goals of instructional tasks, a list of well-sequenced task progressions, common performance errors, teaching cues, and task organizations (Ayvazo & Ward, 2011; Kim, 2015; Kim et al., 2015; Sinelnikov et al., 2015; Ward, Ayvazo, & Lehwald, 2014; Ward, Kim, et al., 2015); and (c) using a content map that illustrates appropriately sequenced and interconnected tasks for teaching a certain sport (Ward, Lehwald, & Lee, 2015). Teacher educators should consider incorporating these research-driven strategies into their curricula in ways that will promote SCK. Further research that examines the effects of each strategy on developing preservice teachers' SCK would be worthwhile.

Conclusion

We examined the extent to which SCK achievement was occurring after completion of elementary content courses by directly measuring preservice teachers' abilities to list developmentally and sequentially appropriate tasks for teaching three manipulative skills. A primary conclusion from this study is that preservice teachers' entry and exit levels of task knowledge that allows for the selection of developmentally and sequentially appropriate tasks for teaching elementary content were insufficient and varied across programs. In particular, we found that some preservice teachers barely improved their knowledge of instructional tasks, even though they passed the semester-long elementary content courses.

The results of the study were rationalized under the two conceptualizations of content knowledge: (a) the independent existence of CCK and SCK and (b) the interrelationship between CCK and SCK (Ball et al., 2008; Sinelnikov et al., 2015; Ward, 2009, 2013). The

operationalized content knowledge concepts allow practitioners and researchers to create learning environments that would nurture and enhance preservice teachers' in-depth understanding of content and to measure their learning outcomes in CCK and SCK. We suggested several strategies to promote preservice teachers' knowledge of instructional tasks: (a) organizing content courses with different content foci, (b) using specific teaching practices driven from research findings, (c) measuring CCK and SCK with relevant pedagogical tasks, and (d) challenging policy initiatives that emphasize CCK and SCK.

In conclusion, this study provides a foundation for initiating ongoing research on content knowledge that employs various research approaches (e.g., intervention or experimental study), and its findings may guide future professional development efforts aimed at strengthening CCK and SCK for elementary school teachers.

Limitations

This study has several limitations that require caution when interpreting the results. First, the results of this study cannot be generalized, because of our convenient sampling method. Second, this study used a small sample of 55 participants from five content courses, which precluded us from using inferential statistics. Third, the pre–post design was utilized without a control group, which limited ensuring the effects of content courses through comparison with the results of a control group. By overcoming these research limitations, researchers could evaluate preservice or in-service teachers' in-depth content knowledge using the four tasks identified in this study.

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PHYSICAL ACTIVITY

Adoption of Comprehensive School Physical Activity Programs: A Literature Review

Kari Hunt and Michael Metzler

Abstract

Recent research has provided preliminary insight into the implementation of Comprehensive School Physical Activity Program (CSPAP) components in P–12 schools, but additional empirical support is needed to establish the CSPAP model as a viable conceptual framework. The purpose of this review is to examine the extent to which the CSPAP framework is currently being adopted and implemented in schools, by each CSPAP component and holistically as a model. Specifically, the review consists of three thematic areas: (a) CSPAP single and multicomponent outcomes based on empirical studies, (b) barriers and facilitators associated with CSPAP adoption, and (c) suggestions for future research and methodological considerations aimed at advancing CSPAP adoption. The information provided in this review expands the knowledge base, which is necessary to transform CSPAP theory into an adoptable and sustainable model for schools.

P–12 physical education (PE) has evolved significantly over the last several decades, with one of the most important changes occurring recently with the inclusion of PE as a core academic subject (Society of Health and Physical Educators [SHAPE America], 2015c). Well-designed PE programs have been acknowledged as having the unique potential to address student learning in all three of Bloom's domains (psychomotor, cognitive, and affective; National

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Association for Sport and Physical Education [NASPE], 2011; SHAPE America, 2015a), but PE did not become a validated core subject until the recent 2015 revision of the federally legislated Elementary and Secondary Education Act (ESEA), a designation long since desired in the field (SHAPE America, 2015c).

The advancement of a holistic approach emphasizing the education and health of students began in the late 1980s with the promotion of the Coordinated School Health Program model by the Centers for Disease Control and Prevention (CDC). The model identifies schools as essential agencies of change in youth health behaviors (Wechsler, McKenna, Lee, & Dietz, 2004) and includes eight components known to strongly influence student health, with PE serving as one of the components (Allensworth & Kolbe, 1987). In 1991, Sallis and McKenzie published the seminal paper "Physical Education's Role in Public Health," highlighting the vital potential contribution of schools and PE in addressing the nationwide concerns related to childhood obesity and physical inactivity.

In response to this critical national concern, the U.S. Department of Health and Human Services (USDHHS, 2008) introduced the first set of approved guidelines addressing physical activity (PA): the *2008 Physical Activity Guidelines for Americans.* The guidelines recommend that children and adolescents engage in at least 60 min of moderate to vigorous physical activity (MVPA) daily. To further convey the importance of increasing PA opportunities, NASPE (2008) released a position statement recommending that all P–12 schools implement a Comprehensive School Physical Activity Program (CSPAP). A CSPAP should include (a) quality PE (QPE), (b) PA during school, (c) PA before and after school, (d) school employee wellness and involvement, and (e) family and community involvement.

The *National Physical Activity Plan* (NPAP Alliance, 2010) includes comprehensive strategies to promote PA by eight sectors of society. The education sector is responsible for outlining strategies and tactics that could be implemented in and around the school setting (NPAP, 2010), with the first of seven strategies specifically targeting the comprehensive approach of the CSPAP. The goal of Strategy 1 is to "provide access to and opportunities for high-quality, comprehensive physical activity programs, anchored by physical education, in Pre-kindergarten through grade 12 educational settings" (Education

section, para. 4). In line with this strategy and the NASPE (2008) recommendation, schools have been identified as one of the most appropriate settings for increasing PA (Institute of Medicine [IOM], 2013; Kelder, Karp, Scruggs, & Brown, 2014; NPAP Alliance, 2010; USDHHS, 2008), and national initiatives such as Let's Move! Active Schools (n.d.) have been established to provide schools and teachers with the necessary resources and tools to increase PA opportunities for students.

Most recently, in *The Essential Components of Physical Education,* SHAPE America (2015a) outlines four components that establish a more direct path for attaining QPE programs: (a) policy and environment, (b) curriculum, (c) appropriate instruction, and (d) student assessment. SHAPE America (2015a) identifies these as foundational components designed to guide schools and physical educators in making PE a more validated subject area. In addition to emphasizing more rigorous policies and higher accountability in the field, SHAPE America (2015a) also strongly endorses the use of the CSPAP framework to increase overall PA opportunities for students.

Efforts to align PE with public health goals have increased since the original Sallis and McKenzie (1991) article, but in a 20-year follow-up, Sallis et al. (2012) suggest that more work is needed to reach widespread adoption of public health goals. Recent research has provided preliminary insight into the implementation of CSPAP components in schools (Erwin, Beighle, Carson, & Castelli, 2013), but additional research is needed to further examine the effect of each CSPAP component on PA outcomes (Carson, Castelli, Beighle, & Erwin, 2014) and to collect empirical support for the CSPAP model as a viable conceptual framework.

Purpose

The purpose of this review is to examine the extent to which the CSPAP framework is currently being adopted and implemented in P–12 schools, by each CSPAP component and holistically as a model. Specifically, the review consists of the following thematic areas: (a) CSPAP single and multicomponent outcomes based on empirical studies, (b) barriers and facilitators associated with CSPAP adoption, and (c) suggestions for future research and methodological considerations aimed at advancing CSPAP adoption in P–12 schools. Although the findings are not exhaustive, the information

provided in this review expands knowledge base, which is necessary to transform CSPAP theory into an adoptable and sustainable model for schools.

Inclusion Criteria

The literature search for this review included refereed journal articles (research and topical), electronic reports, position statements, and books published between 1991 and 2015 and consisted of electronic search databases such as Sport Discus, PsycInfo, Academic Search Complete, and ERIC. Secondary searches within references of cited review articles and manual searches of selected journals and special issues in the field of PE were also included. Excluded from the review were nonrefereed articles, dissertations, abstracts, conference proceedings, and articles published outside of the United States.

The 1991 seminal article "Physical Education's Role in Public Health" (Sallis & McKenzie, 1991) provided the starting point for this review of CSPAP adoption in schools, but empirical articles and reports were reviewed only if the following criteria were met: (a) they were published after NASPE's (2008) CSPAP position statement, (b) the CSPAP model was established as the guiding conceptual framework, and (c) they were related to CSPAP outcomes and implementation. This served to distinguish empirically based studies guided by the CSPAP framework from school-based PA interventions supported by a different theoretical framework and from empirical studies that indirectly addressed a single component or multiple components of a CSPAP. If the intervention or study was not designed or situated within the context of a CSPAP, it was excluded from this review. The first section of the review includes reported outcomes linked to each CSPAP component and outcomes related to implementing multicomponent CSPAPs.

Comprehensive School Physical Activity Program Outcomes

The goal of a CSPAP is to provide a variety of school-based activities and PA opportunities that will enable students to meet the daily recommendation of 60 min of MVPA (NASPE, 2008; SHAPE America, 2015a). The CSPAP framework comprises five synergistic components: (a) QPE, (b) PA during school, (c) PA before and after school, (d) staff involvement, and (e) family and community engage-

ment (CDC, 2013; SHAPE America, 2015a). The examination of each CSPAP component and how effectively it is being implemented in schools is necessary to determine the degree to which it can contribute to PA outcomes (Carson, Castelli, Beighle, & Erwin, 2014).

Quality Physical Education

QPE has been termed the cornerstone of the CSPAP model and provides the foundational base for comprehensive school efforts that aim to increase students' PA (Rink, Hall, & Williams, 2010). Standards-based QPE (SHAPE America, 2015a) is the only PA opportunity within the CSPAP framework that includes specific learning outcomes in a formalized instructional setting (Chen, Hypnar, Mason, Zalmout, & Hammond-Benett, 2014). The minimum recommendations include 150 min/week of PE at the elementary level, and 225 min/week of PE for middle and high school students (IOM, 2013; SHAPE America, 2015a).

To date, only Chen et al. (2014) has explicitly examined the effect of QPE on CSPAP-related outcomes. In a 2-year study, Chen et al. examined the contribution of QPE teaching practices (QPET) in promoting daily PA behaviors of students in and outside of school. The Assessing Quality Teaching Rubric was used to examine the effect of four essential teaching dimensions (task design, task presentation, class management, and instructional response) on nine elementary PE teachers, and a 7-day self-report PA log was used to measure students' daily PA. Chen et al. concluded that QPET and the essential teaching dimensions significantly contributed to students' daily PA in school (PE and recess), more so than to their daily PA outside of school.

QPE is known to be an integral component in creating more opportunities for PA in the school day (Sallis et al., 2012) and can contribute to students' daily PA levels in a short time (Erwin et al., 2013). However, as evidenced by the repeated call for multicomponent approaches, QPE should serve as the foundation in the efforts toward reducing child and adolescent obesity, but cannot act in isolation if substantial progress is to be made (IOM, 2013).

Physical Activity During School

According to the CSPAP Policy Continuum (CDC, 2012), PA during school can include classroom activity breaks, recess, and

drop-ins (more common in secondary schools; Erwin et al., 2013). In one study of PA during school, Goh et al. (2014) used the Take 10! program as part of a 12-week intervention designed to increase elementary students' in-school step counts and PA intensity levels. The elementary teachers were trained to implement the Take 10! program, which consists of 10-min classroom-based physical activities integrated into age-appropriate academic content and learning objectives (Goh et al., 2014). Outcomes measures in this study included (a) students' daily PA levels/step counts (measured with pedometers), (b) students' PA intensity (measured with accelerometers), and (c) teacher fidelity (measured with responses to weekly questionnaires).

The findings included a significant increase in the students' average time spent in vigorous intensity PA from baseline to end-intervention, as well as a statistically significant increase in students' daily in-school step counts at 8 weeks (mid-intervention) as compared with baseline. Based on questionnaire data, Goh et al. (2014) noted that the teachers conducted an average of one Take 10! activity per school day during the intervention (a range of one to three times per day). Students' average time spent in MVPA increased significantly from baseline to end-intervention, representing a nominal increase of approximately 2 min in MVPA (Goh et al., 2014).

Erwin, Beighle, Morgan, and Noland (2011) also conducted a classroom-based PA intervention involving 16 elementary school teachers. The intervention was designed to be low cost and easy to use, with only brief trainings for the teachers. The study included two schools (one intervention and one control). The teachers from the intervention school attended two 30-min classroom PA trainings (by experts in the area of classroom-based PA) and were provided with inexpensive curricular resources (activity break cards). Outcome measures in the study included students' mean school steps per day measured with pedometers and frequency of classroom activity breaks self-reported in teacher logs. The students wore pedometers up to 12 days, and data were collected for three monitoring periods over the course of 1 school year. The compliant teachers reported an average of one activity break or more per day, which was significantly higher than the reported breaks by noncompliant

teachers. The intervention compliance group (i.e., students in class in which the teacher included at least one activity break per day) accrued more school steps per day at the follow-up monitoring period. Three months later at post-follow-up, the compliance group again averaged significantly more school steps per day than did control groups (Erwin et al., 2011).

Studies such as the two described provide valuable insight on the efficacy of classroom-based interventions and the ability to increase students' classroom and daily PA levels through the addition of one PA break per day (Erwin et al., 2013; Erwin et al., 2011; Goh et al., 2014). In two additional studies, researchers investigated classroom-based PA with an emphasis on teacher-level outcomes and perceptions related to the implementation of PA breaks.

As part of a larger 5-year school health study, McMullen, Kulinna, and Cothran (2014) explored elementary and high school classroom teachers' perceptions of using PA breaks. Participating teachers attended 10 professional development workshops each year, had access to mentoring, and were provided grade-level activity break resources. Data were collected from semistructured interviews and teacher reflective journals. Data were analyzed inductively, and three themes were identified that related to key characteristics the teachers considered when selecting activity breaks: threats to classroom control (e.g., chaos during activity, space constraints, and challenge of students getting back on task), a preference for breaks with connections to academic content, and the importance of implementation ease and student enjoyment of activities (McMullen, Kulinna, & Cothran, 2014).

In a second study, Webster et al. (2013) investigated elementary classroom teachers (ECTs) and the relationships between the ECTs' awareness of a statewide policy (the South Carolina Student Health and Fitness Act of 2005), perceived school support for PA promotion in the academic classroom (PAPAC), perceived attributes of PAPAC, domain-specific innovativeness, and self-reported PAPAC. The diffusion of innovations theory and a social ecological perspective served as the theoretical frameworks for investigating possible predictors of ECTs' adoption of PAPAC. Results indicated that the ECTs' awareness of the statewide policy predicted perceived school support. This in turn predicted perceived attributes (attributes, which if perceived

can contribute to the adoption of an innovation) and domain-specific innovativeness (ECTs' level of educational innovativeness or receptiveness to new policy can be a predictor of adoption). Perceived compatibility, simplicity, observability, and domain-specific innovativeness were reported to predict self-reported PAPAC (Webster et al., 2013). This study demonstrates a successful application of two complementary theories, which proved to be useful in the investigation of influential variables related to the adoption of PAPAC.

Recess is another viable strategy for increasing PA opportunities during the school day (CDC, 2013; SHAPE America, 2015a). According to the American Alliance for Health, Physical Education, Recreation, and Dance (AAHPERD, 2011) CSPAP survey report, scheduled recess is provided in over 80% of elementary schools, with 31% of those schools having a policy or practice that prevents recess from being withheld (as a form of punishment or behavioral consequence). Results of the survey also indicated that 76% of the elementary schools provide recess 5 days/week, with 65% of the schools allocating 15–29 min for each recess period. The percentage of schools that provide recess decreases through middle school and even more so in high school, with only 10–11% of schools providing recess (AAHPERD, 2011).

Only one empirical study situated within the CSPAP framework was found to examine the effect of recess on PA outcomes in students. Erwin et al. (2012) used pedometers to determine the contribution of unstructured 15-min outdoor recess periods on school-day PA levels of students from two public elementary schools. A secondary purpose in the study was to determine if recess and school-day PA levels varied by BMI, gender, and grade level. Third, fourth, and fifth graders from the schools wore pedometers for 4 consecutive days and were prompted to record step counts prior to recess, after recess, and at the end of the school day. Pedometer step counts were averaged across the days that the students wore the device.

Results indicated a significant main effect for grade level on the percentage of step counts during recess, with students in fourth grade accumulating a greater percentage than did students in third and fifth grade. There was no significant main effect for BMI or gender on the percentage of steps accumulated during recess. Although boys accumulated a higher school-day step count, there were no gen-

der differences in activity level during recess. School recess supervisors should encourage semistructured and unstructured options and provide a variety of equipment to keep students physically active and engaged (Erwin et al., 2012).

Physical Activity Before and After School

The CSPAP Policy Continuum breaks down the PA before- and after-school component into the following categories: (a) extracurricular sports, clubs, and activities; (b) active transport to school; (c) access to school grounds/facilities; (d) before- and after-school programs; and (e) interscholastic sports (CDC, 2012). Results from AAHPERD's (2011) CSPAP survey indicate that almost two thirds of schools (63%) offer PA clubs and/or intramural sports.

At the time of this review, no empirically supported literature on before- or after-school programming (contextualized within the CSPAP model) could be identified. The effectiveness of after-school PA interventions could be better understood with additional research including school-level randomization, extensive assessments, and follow-up studies (Beets, Beighle, Erwin, & Huberty, 2009). Many of the findings related to after-school interventions lack detailed descriptions of the intervention, contain inconsistent methodologies, and are missing relevant information on program design (Beighle et al., 2010).

Staff Involvement in Physical Activity

When involved in the overall PA mission of the school, staff members not only improve their personal health by being active and reducing job-related stress, but also serve as positive role models for students. According to the 2011 CSPAP survey, involvement for staff entails staff members serving as positive role models for students by having a physically active lifestyle and supporting participation in PA before, during, and after school. Additionally, strong staff involvement often occurs in districts or schools that provide (or subsidize) PA and employee wellness programming for the staff and in districts or schools that aim to create an environment that values and supports PA for students and staff (AAHPERD, 2011).

PA classes were offered in 42% of schools, but in the majority of them less than half of the staff members participated in the activities. To date, no empirical studies have been found that directly examine

staff involvement as a component of a CSPAP, and thus, the contribution to overall student PA outcomes is still unknown (Erwin, Beets, Centeio, & Morrow, 2014).

Family and Community Engagement for Promoting Physical Activity

What students see and do at home is a major factor in influencing behaviors (Centeio, Somers, et al., 2014; Rink et al., 2010), and opportunities to engage in PA should not stop when students leave school (Cipriani, Richardson, & Roberts, 2012). However, even with the recognized effect on youth behaviors, the family/community engagement component is the least implemented in the CSPAP model (Cipriani et al., 2012), leading to a paucity of research in this area (Cipriani et al., 2012; Erwin et al., 2014). As with the staff involvement component, no empirical studies that examined the effect of family and community engagement on PA outcomes were identified within the literature search. The majority of research in this area includes PA interventions based on multicomponent approaches similar to the CSPAP model. Although not included in this review, the intervention studies that included family and community involvement as part of the multicomponent approach have shown greater increases in overall PA levels of children (Cipriani et al., 2012).

The Physical Activity Leader (PAL; SHAPE America, 2015b) has a central role in facilitating more involvement from family and community members. Strategies to promote increased family and community engagement include (a) increasing communication (e.g., newsletters and websites) regarding PE/PA events and opportunities that support family PA, (b) establishing partnerships and sharing expertise with the surrounding community, and (c) sharing facilities with community members (Cipriani et al., 2012).

Multicomponent Comprehensive School Physical Activity Programs

To date, there is a nominal amount of empirical evidence related to the implementation and outcomes of a full five-component CSPAP. This lack of research corresponds to the limited number of five-component CSPAPs that are reported in schools. The 2011 CSPAP survey results indicate that less than one sixth of schools (16% of elementary schools, 13% of middle schools, and 6% of

high schools) provide a CSPAP that consists of all five components (AAHPERD, 2011). The following section will highlight the empirical studies based on multicomponent CSPAPs. To delineate between the varying levels of component implementation, we categorized the studies by the number of components that they include beyond the foundation of QPE (i.e., QPE + 1, QPE + 2, QPE + 3, and QPE + 4).

In a quasi-experimental study, Burns, Brusseau, and Hannon (2015) examined the effect of a CSPAP intervention on school-day step counts of fourth and fifth grade students. The intervention was primarily focused on PE and consisted of teacher trainings and assistance to improve PA and health outcomes. Teachers taught lessons based on an elementary-level curriculum and set goals to have students active for at least 50% of class time. The CSPAP intervention also addressed two areas within the PA-during-school component: recess (e.g., activity stations and semistructured activities) and classroom activity breaks (two or three 5-min breaks were encouraged), designating it as a QPE + 1 study (based on authors' CSPAP implementation categories). Results indicated statistically significant main effects for gender and time, with boys, on average, displaying greater step counts than girls, and a higher average for both boys and girls in daily step counts postintervention as compared to preintervention measures. Overall, the CSPAP intervention increased overall daily step counts and also attenuated the decrease in student daily step counts over the course of a school week (Burns et al., 2015).

Deslatte and Carson (2014) utilized a mixed methods design to identify common characteristics of CSPAPs and strategies for implementing the CSPAP model. The study included two elementary schools and one middle school. Four participants represented each school in the study: a PE teacher (who had implemented at least one other CSPAP component besides PE), two classroom teachers, and an administrator (who was identified by the PE teacher as a supporter of CSPAP). Data collection from the PE teachers included the national CSPAP survey (AAHPERD, 2011), an e-mailed question set, and informal observations. Data were also collected from the classroom teachers and principals through individual interviews. The authors concluded that the role of the PE teacher was "integral to implementing a CSPAP" (Deslatte & Carson, 2014, p. 611), but it was also important for the teacher to seek additional support from

key stakeholders (administrators and classroom teachers) to help facilitate successful CSPAP implementation (Deslatte & Carson, 2014).

In a different study, Centeio, Somers, et al. (2014) examined the effect of an 8-month CSPAP (QPE+4) on the PA outcomes of students, parents, and educators. Specifically, the study addressed PA opportunities in the areas of (a) QPE, (b) classroom PA (including classroom time and specials), (c) lunch and recess, and (d) after-school PA clubs. The study was guided by the social ecological framework (Sallis, Owen, & Fisher, 2008), which addresses the multiple factors and levels of influence on health behaviors, and reciprocal determinism, which suggests that changes within one intervention level can lead to changes in other levels. The authors investigated the effect of simultaneously implemented CSPAP components and the potential for bidirectional influences within the CSPAP system. Six schools participating in the Building Healthy Communities program (whole-school approach focused on PA and nutritional programming) were randomly selected for the study (Centeio, Somers, et al., 2014b).

PA outcome measures included student in-school PA (pre/post) using accelerometers and self-reported PA by parents and educators using the short version of the International Physical Activity Questionnaire (IPAQ). Results indicated a significant difference (increase) in total MVPA minutes. Overall, significant increases were found in time spent in MVPA in PE, at lunch/recess, and in the classroom. A significant overall change in reported metabolic equivalent minutes per week (based on IPAQ scoring system) of parent PA was also found. Results indicated a change in the PA of the educators, but it was not statistically significant, a finding possibly related to small sample size (Centeio, Somers, et al., 2014b).

A 2-year pilot CSPAP study (QPE + 4) was recently completed in an urban middle school in Georgia, in which the researchers conducted an in-depth analysis of the design, implementation, feasibility, and efficacy in achieving a series of outcomes (Metzler, Barrett-Williams, Hunt, Marquis, & Trent, 2015). The CSPAP was based on the Health Optimizing Physical Education (HOPE) curriculum model. The model comprises eight strands, each of which is aligned with the overarching goal of HOPE and the components of a CSPAP: before/during/after-school PA programming; sport, games, dance, and other movement forms; family/home education;

community-based PA programming; health-related fitness; diet and nutrition for PA; PA literacy (consumerism, technology, advocacy); and integration of HOPE across all school subjects (Metzler, McKenzie, van der Mars, Barrett-Williams, & Ellis, 2013).

Pre- and postoutcome data were collected from FitnessGram test results, knowledge tests (PA and healthy eating), and accelerometer measures of PA in PE lessons over 4 days. Results included a significant difference in the percentage of students in the Healthy Fitness Zone between baseline and end of Year 2, a significant percentage gain on the PA/healthy eating knowledge test, and a significant but modest increase (approximately 2 min) in MVPA (during typical PE lessons) from baseline to end of Year 2. The mean number of daily MVPA minutes showed a statistically significant decrease over the course of the study, possibly attributed to seasonal sport offerings and inclement weather during final data collection (Metzler et al., 2015). The after-school program was also found to provide attending students with more than 25 min of MVPA. Based on a composite analysis, Metzler et al. (2015) found that the opportunities provided at the school (PA-focused QPE and after-school PA programming), and not those outside of the school, were key to students accumulating the 60 min of daily PA.

Teacher professional development and the influence on multicomponent CSPAP outcomes was examined in only one study. In a quasi-experimental cluster-controlled study, Carson, Castelli, Pulling Kuhn, et al. (2014) tested the effect of CSPAP professional development on school PA offerings, MVPA, and sedentary behaviors of students (aged 9–14) during school. Weeklong accelerometer measures (baseline/post) were taken for MVPA and sedentary behaviors. Results indicated that intervention teachers (those with CSPAP training/support during implementation) reported significantly more PA opportunities in two of the five components (PA during school and staff involvement in PA).

In relation to PA outcome measures, students spent less time in MVPA and more time in sedentary behaviors during school. The findings exhibit an overall in-school decline in MVPA minutes in control boys and girls, compared to a decline in girls in intervention schools (with no change occurring for boys attending intervention schools). The study by Carson, Castelli, Pulling Kuhn, et al. (2014) demonstrates the potential of a CSPAP professional development

program to influence PA opportunities offered and the ability to offset declines in students' MVPA and increases in students' sedentary behaviors over 1 school year.

The final three studies reviewed were situated in the context of a multicomponent CSPAP and included qualitative case study methodology. The first study was an exploratory single case study used to investigate an existing PE/sport/PA program in an urban Title I K–8 public school over 2 academic years. Doolittle and Rukavina (2014) recognized the similar aim of the CSPAP as a public health model and Lawson's propositions (as cited in Doolittle & Rukavina, 2014) for sport, exercise, and PE professionals and utilized both theories to examine the 10-year-old program.

Data were collected in the form of interviews, observations, and program artifacts and were then used to address questions related to the implementation and institutionalization of comprehensive PA programs and to inform practical implementation strategies for the CSPAP model in urban schools. According to Doolittle and Rukavina (2014), successful CSPAP implementation in the urban K–8 school depended on "building up practical resources, developing policies and practices that did not violate district rules, and finding ways and means to collaborate in the school and in the community" (p. 553).

In the second collective case study, Centeio, Erwin, and Castelli (2014) examined the perceptions and characteristics of elementary PE teachers during the implementation of CSPAP and the certification process of the director of physical activity (now called PAL). The results indicated that although there were barriers in the process of implementing PA opportunities, the teachers in this study focused more on the facilitators and were able to overcome some of the barriers with planning and action plans, supportive administration, and passion and dedication to the health of their students (Centeio, Erwin, & Castelli, 2014).

The last study reviewed was designed to examine CSPAP feasibility through a collective case study of 11 schools in a rural Appalachian county. Guided by a systems approach, Jones et al. (2014) sought to evaluate the contextual and organizational factors that contribute to or inhibit the feasibility of CSPAP development. The authors emphasized the need to evaluate "each school's systems, subsystems, contexts, and constraints individually to determine a

customized approach to CSPAP" (Jones et al., 2014, p. 485). For a CSPAP to be implemented effectively and to be "comprehensive" in nature, change and improvements are needed at the transformational level. Transformational factors (e.g., external environment, mission and strategy, leadership, and culture) and transactional factors (e.g., work climate, systems, organizational structure, task, and individual skills) were identified to have the potential to facilitate systemwide change (Jones et al., 2014).

Comprehensive School Physical Activity Program Adoption: Barriers and Facilitators

To align PE with public health goals, it is necessary to address some of the factors (McKenzie & Lounsbery, 2013) that might be impeding or facilitating progress toward this alignment.

Barriers

A better understanding of the variables influencing this process will "allow for the creation of focused, informed strategies to reduce or eliminate barriers and facilitate the adoption of a more physically active lifestyle" (Beighle & Morrow, 2014, p. 23). PA participation is a health behavior that is influenced not only at the individual level, but also at multiple levels from the surrounding environment (King, Stokols, Talen, Brassington, & Killingsworth, 2002). As a result, ecological models such as the social-ecological model have served as the theoretical foundation for implementing CSPAP models (Metzler et al., 2013) and other PA interventions (Sallis et al., 2008).

Ecological models provide comprehensive frameworks for understanding interacting determinants, as well as provide insight into various levels of influence on targeted health behaviors. Table 1 includes the multiple levels of influence (intrapersonal, interpersonal, organizational, community, and public policy) outlined by Sallis et al. (2008) and some of the cited barriers within each level that may inhibit CSPAP adoption and PA promotion efforts in schools. The table represents only a glimpse into barriers related to CSPAP adoption, but indicates the need for concerted efforts to reduce barriers at interpersonal (teacher) and organizational (school) levels.

Table 1
Ecological Level of Influence and Associated Barriers to CSPAP Adoption

Level of influence	Barriers to CSPAP adoption
Intrapersonal	Time limitations, motivation, energy, knowledge, environment, and confidence (Beighle & Morrow, 2014)
Interpersonal	Social barriers (socioeconomic status, cultural expectations, and support from family or friends) (Beighle & Morrow, 2014)
	Teacher time constraints; overextended teachers/school personnel who are hesitant to volunteer (Deslatte & Carson, 2014; Jones et al., 2014)
	Lack of knowledge or leadership needed to establish CSPAP culture and programming (Deslatte & Carson, 2014; Doolittle & Rukavina, 2014; Jones et al., 2014)
Organizational	School policies, building schedules, curriculum, resources, finances, and facilities; "perceived importance" of physical activity (Beighle & Morrow, 2014)
	Focus on academics (due to standardized testing pressures) (Deslatte & Carson, 2014)
	Lack of centralization within the program (Deslatte & Carson, 2014)
	Frequency and duration of classes; low student enrollment requirements (McKenzie & Lounsbery, 2013)
	Lack of administrative support (Jones et al., 2014; McKenzie & Lounsbery, 2013)
	Limited resources and space needed to plan, develop, and deliver programs; resources to train program supervisors and school personnel (Jones et al., 2014, Metzler et al., 2015)
Community	Logistical constraints (transportation, facility security and maintenance, and liability) (Jones et al., 2014)
Public Policy	Statewide policies, initiatives, and legislation (Beighle & Morrow, 2014); enactment of policies that encourage or mandate prevention efforts (Kelder et al., 2014)

From an ecological perspective, Sallis et al. (2008) pointed out that the "individual level and many levels of external influence are integrated in a single framework, making it clear that causation of behavior is widely distributed, not lodged in one or another source" (p. 482). Interventions should be composite or synergistic (King et al., 2002) and in order to intervene upon and promote PA behavior in any given population effectively, it is important to understand not only the influences that inhibit, but also those that facilitate the promotion of the targeted behavior.

Facilitators

PE teachers have been recognized as the most qualified for CSPAP leadership roles (Beighle, Erwin, Castelli, & Ernst, 2009), and training programs have been designed to assist teachers in becoming PA champions and advocates for QPE and PA in their respective schools. Most recently, SHAPE America, in partnership with the Let's Move! Active Schools program, has begun to offer professional development opportunities through the PAL Learning System and Training (SHAPE, 2015b). Additionally, Castelli and Beighle (2007) suggested one of first steps PE teachers can take to lead or direct PA efforts is to join their school's wellness team. For the school staff/wellness teams to expand the CSPAP model successfully, more support (financial, time, equipment, and personnel; Deslatte & Carson, 2014), action plans, and an overall dedication to the health of students is needed (Centeio, Somers, et al., 2014). Increased incorporation of the CSPAP framework into physical education teacher education (PETE) programs is also strongly recommended (Bulger, Housner, & Lee, 2008; Kelder et al., 2014).

Conceptual models have recently been proposed for more effective implementation and sustainability of CSPAPs (Webster, Beets, Weaver, Vazou, & Russ, 2015). One particular model is based on the premise of internal–external partnerships, which include specific strategies such as community-based participatory research, communities of practice, and service learning. All three strategies serve to complement the teacher (the CSPAP champion or leader) in implementation efforts (Webster et al., 2015). Utilizing communities of practice and school–university partnerships can assist in making professional development more scalable and sustainable (Bulger & Housner, 2009; Castelli, Centeio, & Nicksic, 2013).

Similar to how the existence and sustainability of a coordinated school health program is dependent on overall school environment, district infrastructure, and policy (Lohrmann, 2008), the effectiveness of a CSPAP is dependent on upstream influences (Kelder et al., 2014), which consist of procedures and policy that can facilitate or inhibit overall implementation and sustainability (IOM, 2013). Schools cannot be alone in making and sustaining the changes that will influence the PA behaviors of the nation's youth. Various stakeholders and multiple levels of support are needed for effective change to take place (IOM, 2013).

Future Research and Methodological Considerations

Efforts are currently being made in schools to increase opportunities for PA and to help students achieve 60 min/day of MVPA (USDHHS, 2008). However, it is still unclear how many of these efforts are guided by the CSPAP model and if in fact fidelity to the *full* CSPAP model is being achieved. It is becoming increasingly clear that one size does not fit all when it comes to CSPAP, and what works for one school, district, or county may not work the same in similar settings. Customized approaches to CSPAP implementation, extensive needs assessments, and additional feasibility studies are needed to examine each school thoroughly (Jones et al., 2014) and to address contextualized barriers that may be inhibiting full CSPAP adoption.

Another recommendation is to utilize available resources such as the CSPAP Policy Continuum (CDC, 2012), which was developed to support schools, districts, and states in the process of CSPAP adoption. It is imperative to understand what school-, district-, and state-level policies are in place to support and facilitate effective adoption (Kelder et al., 2014; Mckenzie & Lounsbery, 2013) and how policy can ensure sufficient opportunities are provided for students to meet the recommendation of 60 min/day of MVPA. The CSPAP Policy Continuum provides meaningful steps toward optimal policy and suggestions for monitoring the progress and sustainability of each CSPAP component. The application and usability of the continuum has been demonstrated in recent research (Doolittle & Rukavina, 2015) and can be used to assess the level of existing program elements compared to that of the five CSPAP components. Further application of tools such as the continuum (CDC, 2012) and

the step-by-step CSPAP guide for schools (CDC, 2013) will direct the field toward evidence-based best practices.

Adherence to a comprehensive and multilevel approach to CSPAP implementation also generates the need for additional theory-based research. To date, few researchers have utilized theory or models to guide intervention design in PA intervention studies (Ickes, Erwin, & Beighle, 2013). Theory-based programs are supported because they are known to "aid in the development of measurable program outcomes, help in the design of interventions, provide a framework for effective programming strategies, and increase the likelihood of successful replication" (Ickes et al., 2013, p. 925). Future application of theories such as the diffusion of innovations (Webster et al., 2015) and the social-ecological model should be strongly considered for investigations into CSPAP components and adoption of the full CSPAP model.

Complementary research methods, which utilize both quantitative and qualitative measures, may advance understanding of the complexities behind CSPAP and the interactions that take place within schools, PA behaviors of children and adolescents, and the training and professional development of preservice and in-service teachers (Castelli, Carson, & Kulinna, 2014). In accordance with McKenzie's (2007) assertion that in-service professional development and preservice preparation in PETE need substantial revisions, future research is still needed to examine preservice and in-service PE teachers' knowledge base and level of preparedness in relation to effective CSPAP implementation (Webster et al., 2015). Although various articles have addressed the implications for preservice teacher preparation and purposeful integration of CSPAP components into existing curriculums (Karp, Scruggs, Brown, & Kelder, 2014; McMullen, van der Mars, & Jahn, 2014), it is important to first understand what factors and levels of influence are inhibiting the adoption of CSPAP in schools at this time.

The purpose of this review was to examine the extent to which the CSPAP framework is currently being adopted and implemented in P–12 schools. Empirically, the reported outcomes associated with each CSPAP component are minimal, and the effect of full five-component interventions based on the CSPAP model is still unknown. What is also not apparent is the magnitude of the *C* in

CSPAP, that is, how comprehensively the model needs to be implemented to be successful (Deslatte & Carson, 2014); what PA outcomes can be achieved when all five components are in place (Erwin et al., 2014); and the feasibility and potential of PE teachers' attitudes toward implementing a CSPAP (Centeio, Erwin, & Castelli, 2014).

With increased promotion and implementation of CSPAPs in schools across the country, subsequent empirical studies need to be conducted to gain a better understanding of the feasibility of adopting the CSPAP framework into a sustainable practice. As evidenced by this review, future empirical research is needed to answer some of these remaining implementation and feasibility questions, many of which can be best addressed by those standing on the front lines of CSPAP implementation: the PE teachers. If PE teachers are going to assume the role of protagonist in adopting CSPAP in schools, then a more extensive examination into the influence of PE teachers on CSPAP-related outcomes is warranted.

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PHYSICAL ACTIVITY

Physical Activity Preferences of Overweight Fourth and Fifth Grade Students

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Abstract

The purpose of this research was to contribute to the childhood obesity mitigation literature by determining the PA preferences of obese/overweight (o/o) elementary students who participated in Club Fit!, a school-based PA program designed to engage the students in developmentally appropriate, moderate-vigorous PA and enhance their regard for PA participation. An o/o intervention typically features PA engagement, but little is known about this population's preference tendencies. Because preference is a key motivator of PA participation, understanding preference parameters is valuable to intervention design. Each program session concluded with journaling, during which the students offered written responses to questions pertaining to that day's session. Journaling was an intentional program component for its ability to solicit information from the students that enabled the program directors to track their physical and emotional progress. Standard interpretive strategies were used to analyze the 1,396 journal entries produced over 1 academic year of program delivery that pertained to activity preference (e.g., What activity did you like? What activity do you want to do at home?). The top five most preferred activities were soccer, tag, PACER, basketball, and football. Further analysis indicated the stu-

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dents mostly preferred traditional team sport activities and those that involved object control skills. The results suggest that o/o elementary students are similar to normal weight peers in their activity preference and WANT to participate in mainstream, traditional team sport and exercise activities. The results also indicate this population's preference to be treated like normal children vis-à-vis engagement in normal activities. Further investigation ought to delve more deeply into the nuances of preference (e.g., exploring different qualities of team sports), but these results can be useful toward informing the design of o/o intervention.

The childhood obesity/overweight (o/o) epidemic has professionals across multiple disciplines seeking effective mitigation. Over 30% of USA children and adolescents between the ages of 2 and 19 carry unhealthy weight (Ogden, Carroll, Kit, & Flegal, 2012). Approximately 12.5 million are obese, and statistically, over 50% will carry obesity into adulthood and raise children who will become obese (Freedman, Wang, & Thornton, 2009; Togashi et al., 2002).

Children with unhealthy weight face a litany of physical, emotional, and cognitive consequences. The physical consequence pervades all organ systems and includes high blood pressure, high cholesterol, type 2 diabetes, sleep apnea, asthma, liver damage, glucose intolerance, nonalcoholic fatty liver disease, bone density deficiency, gall bladder disease, and certain cancers (Bakker, Twisk, & Van Mechelen, 2003; Ball et al., 2008; Centers for Disease Control and Prevention [CDC], 2010; Must & Strauss, 1999; Weiss, Dziura, & Burger, 2004). As well, these children will likely develop osteoarthritis (Wearing, Hennig, Byrne, Steele, & Hills, 2006), are twice as likely than normal weight children to have arm and wrist fractures (Goulding, Cannan, Williams, Gold, & Lewis-Barned, 1998), and are predisposed to hip fracture risk as they age (Maffeis & Tatò, 2001). Their cardiovascular fitness is significantly compromised compared to that of normal weight children (Mastrangelo, Chaloupka, & Rattigan, 2009).

Common emotional and cognitive ramifications include low self-esteem, social ostracizing and isolation, poor body image, and being bullied (CDC, 2010; Nowicka et al., 2008; Pate, Health, & Dowda, 1996; Wang & Veuglers, 2008), which can precipitate risky behavior and depression that leads to significantly more suicidal

thoughts and actions than normal weight peers have (Strauss & Pollack, 2001; Whetstone, Morrissey, & Cummings, 2007). As well, compared to normal weight children, o/o children are academically deficient, more often absent, and more likely to exhibit behavior problems when in attendance (Coe, Pivarnik, Womack, Reeves, &, Malina, 2012; Donnelly & Lambourne, 2011; Lumeng, Gannon, Cabral, Frank, & Zuckerman, 2003; Taras & Potts-Datema, 2005; Van Dusen, Kelder, Kohl, Ranjit, & Perry, 2011).

Research targeting the underlying cause of o/o has uncovered a complexity of contributory factors, including energy balance and a range of biologic and ecologic bases. Overweight children are significantly more screen active (e.g., watching TV, playing video games) and less physically active than are regular weight children (Anderson, Economos, & Must, 2008; Elder et al., 2010). A compelling biologic contributor is genetic predisposition. Children of overweight parents are more likely to become overweight than are children of normal weight parents (Elder et al., 2010). Ecologic reasons include low socioeconomic status (Humbert, Chad, Spink, & Muhajarine, 2006), living in underserved neighborhoods perceived to be unsafe (Gray et al., 2007), and offering few quality physical activity (PA) opportunities (U.S. Department of Health and Human Services, 2000). Compared to regular weight peers, overweight children fill time with screen activity because of less adult-structured "productive" activity (Gray et al., 2007) ,and they have (overweight) parents who set fewer limits on sedentary activities and provide less support to engage in PA (Elder et al., 2010).

Increasing PA is key to mitigation (Bulk-Bunschoten, Renders, Van Leerdam, & HiraSing, 2005; Strong et al., 2005), but multiple barriers hinder this population's engagement, including low self-efficacy related to motor (sport) or fitness skills (Gillison, Standage, & Skevington, 2006; Lubans & Sylva, 2009; Welk & Joens-Matre, 2007), which is significant because self-efficacy is a key determinant of PA engagement. Motor skill competency, the "mastery of physical skills and movement patterns that enable enjoyable participation in physical activities" (Castelli & Valley, 2007, p. 359), predicts engagement—those who are motor skill competent are significantly more likely to engage in PA than are those who are less competent (Fisher

et al., 2005; Langley, 2006; Okely, Booth, & Patterson, 2001; Stodden & Goodway, 2007).

Skill competency, thus a pathway to regular PA, is developed through skill practice (Stodden & Goodway, 2007). Overweight children feel incompetent about PA participation (Langley, 2006), and research supports they tend to be low skilled (Duncan, Stanley, Leddington, & Wright, 2013). It is unclear if they are low skilled because they are inactive or they are inactive because they are low skilled, but the reluctance for active play pervades into adulthood (Kantomaa et al., 2011).

Despite engagement barriers, overweight children understand the importance of PA to well-being, want to increase their PA (Jansen, Mackenbach, Joosten-Van Zwanenburg, & Brug, 2010), and have done so when the activity environment

- uses a developmental approach to address skill acquisition (Alberga et al., 2013; Goldfield, Mallory, Prud'homme, & Adamo, 2008; Griffin, Meaney, & Hart, 2013; Meaney, Hart, & Griffin, 2009; Nye, 2008; Valentini, Rudisil, & Goodway, 1999; Wallhead, 2007),
- offers programming aligned to nationally recognized standards (treats the participants "normally"; Cale & Harris, 2006), and
- offers programming that reflects the participants' preferences (Cale & Harris, 2006).

Purpose of the Study

Overweight children tend to be underactive; thus, increasing PA to establish healthy energy balance is a mitigation key. But the plaguing factors of low skill and lack of enjoyment complicate intervention effectiveness, with competency and enjoyment predicting engagement (Goldfield et al., 2008). Therefore, understanding the activity preferences of o/o children could inform intervention considering the significance of this variable to sustaining regular PA. The purpose of the study was to examine the activity preferences of o/o elementary students during Club Fit!, a school-based PA intervention program. The specific question that drove this research was, what are the PA preferences of o/o children? The researchers sought to contribute to the literature by addressing how a club for o/o chil-

dren identifies specific PA preferences. The affiliated university's IRB board approved this study.

Method

Club Fit! is a PA intervention program for o/o children and adolescents that has been conducted in school, after-school, and community-based settings. This research emerged from intervention conducted at a suburban Los Angeles elementary school of 505 students situated in a predominantly minority, low SES neighborhood in which the majority of students reside.

Club Fit! originated from the initiative of a health-related nonprofit organization (NPO) serving the school's greater community. The NPO sought to address the obesity prevalence at this elementary school with which they had an established relationship. The NPO invited higher education kinesiology departments to submit intervention proposals. Our mid-sized public university is geographically convenient to the elementary school. Two Kinesiology faculty members, both pedagogy specialists with a youth development interest, codirected Club Fit!.

Participants

Club Fit! was delivered to 35 o/o fourth and fifth grade students twice weekly during the last instructional period of the school day for 60 min in 8-week sessions that followed the university's Fall, Winter, and Spring Quarters. The students were screened by the school nurse and/or nominated by the fourth and fifth grade classroom teachers. Students were chosen based on their need to become more physically active. The students ($N = 35$) were predominantly of Latino descent (97%). The objectives were to engage the participants in moderate-vigorous PA, to foster positive perceptions of PA participation, and to foster attributes of responsibility. Undergraduate pedagogy students aided delivery, so the participants received feedback, mentoring, and encouragement from multiple adults during each meeting. Prior to beginning each 8-week session, the codirectors oriented the undergraduate students to the program and outlined their responsibilities.

Teaching Format

Each Club Fit! meeting followed an intentional format to address each program objective appropriately. The format follows the framework used to teach personal and social responsibility (Hellison, 2003), which includes the following components:

- **Relationship time:** This time was used to work on student–teacher relationships. This provided the opportunity to get to know the students well. Informal conversations about school and home life occurred, and trust among the teachers and students was established. "Instant activity" options listed on a white board were used to engage students at the beginning of class (e.g., jump rope, play catch).
- **Awareness talk:** A discussion occurred on the topic of responsibility and how it is integrated into the lesson. The awareness talk set the tone and expectations for the class session. Students then moved into Dynamic warm-ups (e.g., tag games) and dynamic stretching before beginning the main learning experiences.
- **Lesson focus:** This phase was used to develop responsibility and skills. The majority of class time was spent here in skill practice and application. Skill practice from a developmental approach (Graham, Holt/Hale, & Parker, 2013) is a program pillar because motor skill proficiency can determine life span PA participation and successful participation motivates further engagement. The participants engaged in skill practice according to their proficiency level, which meant modifying activities as necessary to ensure success and then adding progressive challenge.
- **Group Meeting:** A debrief was conducted to ask students how they did as a group with regard to personal and social responsibility. Student voices were heard and the dialogue became focused on their level of responsibility and understanding of the content.
- **Reflection:** This was dedicated time for students to reflect on their individual involvement in the learning process. Each meeting concluded with journaling, for which each participant responded to three to five questions about their participation (e.g., What activity did you like best today?) and

aspects of responsibility (e.g., How did you help someone today?). "Journaling" labeled this component but not as a diary of self-selected topics, but rather as questions that referenced that day's activities and occasionally activity beyond Club Fit! (e.g., What activity did you do at home?). A codirector provided specific feedback to the participants about their responses. The participants were so interested in reading these comments that when they received their journals, the students became notably quiet as they read the provided comments.

The majority of the children participated in all three 8-week sessions. The classroom teachers' discretion about participation was the main fallout reason. The codirectors inquired about stoppage decisions but ceded involvement to the teachers. One participant chose to quit.

Data Collection

Each Club Fit! meeting concluded with the participants providing written responses to questions about that day's Club Fit! and occasionally broader PA engagement. The student journals (N = 1,536) from one school year's program sessions were collected to explore the participants' activity preferences. This included 48 meetings that involved 61 unique students: 25 participated in all three 8-week sessions and 36 participated in one or two, producing 1,536 journal responses.

Data Analysis

The standard interpretive research analysis method of constant comparison drove data analysis (Miles & Huberman, 1994). Analysis began by the researchers determining that 1,396 responses related to questions about activity preference (e.g., What activity did you like? What activity do you want to do?). Each response was compared to previous responses and either added to a similar category (e.g., all responses that stated "basketball" were listed under basketball) or added as a new category. Next, each category of responses was tallied for frequency, which determined activity ranking from most to least indicated (thus most to least preferred).

The raw responses were also labeled according to activity type (team sport, individual/dual sport, or fitness) and the primary motor skill focus (object control/manipulation, locomotor, and nonlocomotor).

Reliability and Trustworthiness

To account for reliability and trustworthiness, the first author independently analyzed the journal responses to corroborate those determined to reflect activity preference. Second, a peer reviewer, a colleague of the first author otherwise not involved in the delivery or research of Club Fit!, validated how the responses were labeled according to activity type and primary motor skill focus. Two discrepancies about the activity type label emerged, which was resolved upon discussion between the first author and the peer reviewer.

Results

Club Fit! participants provided 1,396 responses about activity preference. Table 1 shows the 20 most to least preferred activities (of the 72 unique activities mentioned), showing strong preference for team sports (soccer, basketball, football, kickball), followed by nearly as strong a preference for fitness-related activity, specifically the PACER.

Table 1
Top 20 Most Preferred Activities

Activity	Number of mentions
Soccer	185
Tag (running games)	163
PACER	134
Basketball	134
Football	129
Kickball	94
Jump Rope	89
Walking/Jogging	41
Baseball/Softball	35
Jumping Jacks/Jumping (plyometrics)	30

Table 1 (cont.)

Activity	Number of mentions
Dance	25
Hula-Hoop	19
Handball	18
Swimming	16
Volleyball	16
Burn-outs (cardiovascular fitness activity)	14
Obstacle course	14
Skateboard	13
Bicycling	11
Frisbee	9

Table 2 displays activity preference according to activity type. Team sports were most preferred, followed by fitness activities (e.g., PACER).

Table 2
Activity Preference According to Activity Type

Activity type	Occurrence
Team Sports	36
Fitness Activities	32
Combination	4

Table 3 displays activity preference according to the type of motor skill practice. Object manipulation skill activities were overwhelmingly preferred (e.g., throwing/catching, kicking), followed by locomotor activities (e.g., and nonlocomotor activities).

Table 3
Activity Preference According to Type of Motor Skill Practice

Type of skill practice	Occurrence
Object Control	32
Locomotor	17
Nonlocomotor	12
Combination	11

Discussion and Implication

In this study, the researchers explored the PA preferences of o/o fourth and fifth graders who participated in a school-based intervention program. Previous research has uncovered some characteristics of effective intervention, but little is known about the PA preferences of this population. The results are valuable to intervention design because PA preference is key to motivated participation in PA.

First, the emergence of traditional team sports as overwhelmingly preferred suggests o/o children share a similar disposition to their regular weight peers in regard to activity preference—even though it may appear otherwise when o/o children are perceived as indifferent to, if not altogether disinterested in, activity engagement. This result fits with the suggestion that o/o children want to engage in culturally or environmentally mainstreamed sports/games (Rodenburg, Oenema, Pasma, Kremers, & van de Mheen, 2013) and WANT to participate in sports as the means to increase their activity level (Jansen et al., 2010). The participants may have been especially interested in soccer because of its prominence within the Latino culture. This is reasonable considering the accepted notion that activity preference is influenced by culturally mainstreamed sports. To note, it is possible that students participated at a higher level because of the use of the Responsibility Model. Students were taught to respect one another, regardless of skill level. They were also prompted to help one another.

Second, the emergence of traditional team sports as overwhelmingly preferred supports the suggestion that intervention content ought to be aligned to nationally recognized PA programming standards, and thus the participants are treated as "normal" (Cale & Harris, 2006). Traditional team sports and the skill development required to engage successfully underlie the K–12 curricular guidelines that have been established by professional organizations to yield a physically educated individual (SHAPE America, 2013). Although daily life for o/o children can be different from that of regular weight youth because of the condition affecting their physical, emotional, and cognitive function, treating them differently in the realm of PA might only exacerbate their social isolation and ostracizing (CDC, 2010; Nowicka et al., 2008; Pate et al., 1996). The result of traditional team sports as a predominant preference appears to

indicate o/o children no more want to be isolated from their regular weight peers than developmental experts suggest they should be (Robinson, 2006). It is possible that the use of the Responsibility Model allowed all children to feel a sense of belonging and to feel encouraged to participate regardless of ability. Also, quality physical education modifies instruction to meet the needs of all students. Both attributes were part of the Club Fit! program.

Third, the results also suggest that formal exercise (e.g., calisthenics, running) is not taboo. The participants indicated preference for numerous forms of formal exercise, and this is perhaps counterintuitive to intervention design. A top exercise favorite was the PACER test (running 25 yd back and forth on a time interval as many times as possible without missing the interval), which is used to measure cardiovascular fitness as an alternative to a timed distance run. Many overweight AND regular weight children prefer the PACER test to timed distance running, considering the PACER test to be more fun and less humiliating to those with low fitness by eliminating the public finishing order that characterizes timed runs (Blasingame, 2012; Meredith & Welk, 2010; Freedson, Cureton, & Heath, 2000; Wilkinson, Brown, Graser, & Pennington, 2012). The high preference for exercise may be surprising, but preference for the PACER test itself fits the suggestions that intervention ought to involve maximum participation (Green & Reese, 2006), minimize social comparison (Griffin et al., 2013), and be fun (Alberga et al., 2013).

Further, the motor skill focus and activity preference findings align and strengthen the suggestion that o/o children WANT to engage in sport-related PA. The participants were predominantly interested in object control activities (e.g., throwing, kicking), which complements the preference to play team sports. Team sport engagement is predicated by possessing adequate skill to negotiate the demands of a sport successfully. The findings suggest that the participants were especially motivated to practice the skills necessary to play the preferred sports, which also supports previous results that call for intervention to address skill acquisition (Alberga et al., 2013; Goldfield et al., 2008; Griffin et al., 2013; Meaney et al., 2009).

Finally, it appears that the developmental approach to activity delivery influenced activity preference. This bears mention consid-

ering self-efficacy is a significant correlate to engagement motivation (Zhang, Solomon, Goa, & Kosma, 2012) and the developmental approach intentionally targets motor skill self-efficacy by offering success-based skill practice. In accordance with the developmental approach, the participants never experienced basketball, for example, in its full-sided form, rather they experienced it with modifications to rules and space that aligned to their skill capacity. Yet basketball (and other similarly presented team sports) ranked highest on the preference scale. This aligns with current research suggesting intervention ought to feature a developmental approach to programming (Alberga et al., 2013; Goldfield et al., 2008; Griffin et al., 2013; Meaney et al., 2009) and supports the notion that an appropriate environment increases engagement (Griffin et al., 2013).

Further research ought to ascertain from o/o children how a developmental approach aids to neutralize engagement barriers. A developmental approach to programming may supersede the inclusion of any specific activity. In addition, although these results offer valuable information to practitioners designing intervention, they are but a glimpse into the population's activity preference. More studies would lead to reliable guiding principles and additional discernment according to varied demographics. Overall, it appears that those performing an intervention ought to avoid assuming that o/o children do not want to engage in mainstream sports/activities or formal exercise because of their size.

Limitations

First, past this context, generalized results cannot be assumed. Second, unforeseen factors may have influenced activity preference. For one, this region is home to a storied professional basketball team that endears an impassioned fan base, including many of the participants, who often wore team-branded sportswear. This may have been influential during the program session when the NBA season was in full stride and the team was doing well. Further, a state mandate requires that fifth grade students take the Fitnessgram fitness test and that the results be submitted to the state department of education. Many fifth grade teachers prepare students for the test throughout the school year, if by nothing else by reminding them it will be conducted. This factor may have heightened the fifth grade participants' awareness of exercise.

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SPORT HISTORY

From Field Days to Olympic Gold: How Black Women Revitalized Track and Field in the United States

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Abstract

The sport of track and field in the United States has a storied but tumultuous past, especially in women's collegiate athletics. In the late 19th century, it was enjoyed by women at elite colleges in the form of a "field day," but would have trouble surpassing that level, among middle class Whites especially. This hurdle in large part was due to the prevailing ideas at the time regarding what was acceptable physical activity for women, which was inextricably tied to the norms of White hegemonic femininity. Female physical educators reinforced these norms with the creation of "play days." The abandonment of the sport by Whites in the early part of the 20th century opened a window for African American (Black) women at historically black colleges and universities (HBCUs) to step to the line. They pushed the boundaries of acceptable femininity, redefining their place as Black women in a time in which others would rather they stay on the margins of society. The purpose of this study was to understand the student-athlete experience for women during the 1950s and 1960s as it related to society's views on femininity and gender roles at the time. A second purpose was to examine the factors that allowed for the acceptance of women's track and field for Black women at HBCUs while it was considered an improper

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activity for Whites. During the research of Black women athletes at HBCUs in the 1950s and 1960s, the researchers paid specific attention to scholarships, travel to competitions, and the perceived value of these female athletes to their respective institutions. The researchers used an archival retrieval method to gather historical data from Internet resources. The student-athlete experience for the TSU Tigerbelles in the 1950s and 1960s was a different experience than what athletes experience today.

Today, women participate professionally and as amateurs in practically every major sport. As the skill level of competition has improved over the years, so has the public's view of women's sport. The public perception of women's sports has changed, but it has done so slowly over the years. In the modern era of sport, women's power and skill in competition are celebrated—they are viewed as athletes first, not just "ladies." The following quote by Daley exemplifies the public opinion regarding female athletes in the 1950s and 1960s:

> It just doesn't seem right to watch a female leap clumsily over the bars, throw the weights awkwardly or scamper over a track in unladylike fashion. They lose all their daintiness and appeal. Besides, the Paris couturiers add to the woman's attractiveness much better than do the designers of track suits, even skimpy ones. (Daley, 1960, p. 20)

As the quote indicates, at this time female athletes were still being judged as ladies during athletic events, rather than as true athletes with dedication and skill. Western mainstream media and popular culture primarily define the current ideal body type. For women specifically, it is characterized as being tall, thin, and well-toned.

The Beginning of Women's Physical Education

Since the early part of women's higher education, physical education has been a required component of the curriculum for women. Students at Mount Holyoke College were required to walk a mile a day, as early as 1837 (Tricard, 1996). About 20 years later, this requirement was upped to a half hour of physical activity daily, preferably outside. By the late 19th century, walking clubs started popping up at colleges and universities across the United States. Walking as

an activity for women could not be engendered, because it was an activity that was essential to normal human life and functioning. It was also a cost-effective activity for universities to offer women, because it required no equipment or uniform, no coaching, no rules, and no facility. Eventually, women took walking a step further, making it competitive. This "walking mania" captured the attention of the United States for a time as a spectacle, even allowing women to earn prize money for their efforts. But after 1880, reports of walking competitions were scarce, along with any other type of report of women's athletics. This in large part was due to the popularity of sports that took place inside gymnasiums, basketball and gymnastics being chief among them.

The first field day appeared at Vassar College in 1896, where four events were contested: the 100-yard dash, running broad jump, running high jump, and the 220-yard dash. For this day, there was no training of any kind prior to the competition. The public reacted to this field day with patronizing esteem because at the time this type of activity was far outside the realm of acceptable activity for women. In the following years, efforts were made to keep the date of the field day secret to keep the press away, which further discouraged the efforts of the students. The field day at Vassar College was truly for the students; the prying eyes of the public were not invited, nor were the discouraging words of the press. Vassar continued its field days uninterrupted for 40 years, which spurred similar field days at other institutions.

Women's Movements in the 1840s

Leading up to the Civil War, attitudes regarding women's physical education were quite favorable, in part because of the momentum building in the women's movement. The industrial revolution saw women and housewives with more time to spend on activities outside the home. The industrial revolution caused factories to begin encompassing many female duties such as "spinning and weaving" (Donnaway, n.d., para. 5). With this excess time, women began taking an interest in social work. Women created safe spaces for other women in need, created charity schools, and began taking an avid interest in the abolition movement. This newfound interest in social issues led to a desire for equal rights, which prompted Elizabeth Stanton and Lucretia Mott's first women's rights convention, which

was held in Seneca Falls, New York, in 1948. The efforts of Stanton, Mott, and Susan B. Anthony paid off in 1860 when New York passed a law recognizing the rights of widows, women's property rights, and women's parental rights (Donnaway, n.d.). This progress was halted with the onset of the Civil War, and concern shifted to abolition. After the Civil War, women were forced to take a back seat to the cause of Black male suffrage.

Physical Education in the 19th Century

Physical education for women and girls was seen as a means of staving off health problems, specifically spinal issues that were common in inactive individuals during the 19th century (Park, 1978). Leading researchers of the time also advocated against the wearing of restrictive clothing such as corsets for women and girls during this time for similar reasons. In previous years, men had led the charge for women's physical education. However, with a newfound interest in social issues and their own rights, female physical educators began to advocate for the athleticism of their fellow women. Female physical educators viewed competitive sport as a force of corruption, because they felt that men's sports had suffered a moral crisis from intercollegiate competition. Thus, it was of great concern to them that women's physical education avoid the perceived pitfalls that men had encountered. Before, women's activity was focused on movement for the development of healthy bones and organs and was seen as a way to combat spinal issues. During this time, the tenets of acceptable women's physical education shifted to focus on play for play's sake and emphasized inclusion of all women, regardless of physical ability or skill. Earlier sport offerings for women were centered on Victorian era country club sports. These sports had the most appeal to upper class Whites, in part because most of them required expensive equipment to play. These sports typically included tennis, croquet, and golf.

At the turn of the century, there was an influx of immigrants into the United States. Most of these immigrants came from countries in Europe such as Poland, Germany, and Ireland. The sport of track and field enjoyed more popularity in Europe, and these immigrants brought their zeal for the sport with them. Soon thereafter, industrial leagues were formulating across the country to provide opportunities for these new Americans to participate in an activity that re-

minded them of their home. To keep up with the surge in popularity of industrial leagues, female physical educators scrambled to come up with an answer that would help them avoid the advent of collegiate sport for women and the ethical pitfalls inherent therein. Their answer was the play day (Guttmann, 1991). Social conventions of the time stated that female educators should oversee the education of other women, especially when the physical body was concerned. The play day was born as a way to give women the opportunity for physical activity and sport, free from competition. For these play days, teams were mixed between institutions, no score was kept, there was no formal practice or coaching, and there was always a social aspect added to the day, usually a dance or tea. There is no arguing that these opportunities for women were better than nothing, but they served to reinforce Victorian era stereotypes regarding what women were fit to do and what activities were suitable for a lady.

For the proper middle class Victorian lady, the matters in the home were always to be considered above all other concerns; a woman's value was based on her viability as a wife and a mother. In the late 19th century, doctors worried that women had a limited amount of energy that they could expend in a lifetime and thought that energy should be used to birth healthy children. For this reason, physical activity was not endorsed for females, except within acceptable middle to upper class frameworks. These frameworks approved of sports such as croquet, half-court basketball, and archery. However, they did not allow for the more masculine sports such as track and field. The inherent nature of track and field is competitive; results can easily be compared between other competitors. This competitive aspect was not a virtue that a proper lady would pursue. Additionally, the events in track and field represented measures of power and speed that were uncharacteristic for women of the time. Acceptable movements for ladies consisted of graceful, fluid-like movements; the sprints, throws, and jumps of track and field were too rigorous for a true lady. Add to this that track and field was not considered normal, and it was classed as a working class sport; no specialized equipment was needed to participate that would preclude the working class people from participation. Because of this, track enjoyed popularity among the immigrant populations that made up the industrial workforce.

Historically Black Colleges and Universities

Historically black colleges and universities (HBCUs) began cropping up all over the country following the end of the Civil War. These colleges and universities dedicated to the education of African Americans and former slaves started small. Marybeth Gasman, an HBCU historian, describes the first small, all Black colleges: "They started in church basements, they started in old schoolhouses, they started in peoples homes" (Freemark, 2015, para. 9). HBCUs have humble roots, yet the idea of all Black colleges began to take off. The early 20th century was dubbed the golden age of Black colleges. With Southerners unwilling to desegregate their schools, HBCUs such as Tuskegee attracted the brightest Black students and professors. These two groups were unable to find desegregated universities willing to welcome Black students and professors, making the HBCUs their only option. HBCUs were training and educating the majority of the "nation's black doctors, lawyers, dentists, teachers and other professionals" (Freemark, 2015, para. 14). In 1976, the enrollment of females at HBCUs was 117,944, as opposed to 104,669 males (Redd, 1998). These numbers show that females were reaping the benefits HBCUs had to offer, just as much as their male counterparts.

Two historically Black colleges enjoyed a great deal of success between 1930 and 1970: the Tuskegee Institute and Tennessee Agriculture & Industrial State University (Tennessee A & I; later known as Tennessee State University, TSU). Carter-Francique and Richardson (2015) described the climate at HBCUs between 1954 and 1968 as safe zones for Black women to express themselves fearlessly. Historically, Black colleges made it part of their mission to advocate for uplift and racial solidarity; part of this reached over into the realm of women's athletics. The conceptions of White womanhood were limited in scope, but Black women did not see themselves through such a narrow lens. Black womanhood included characteristics such as resiliency, strength, righteousness, community engagement, and commitment to family—all of which were embraced by HBCUs.

The purpose of this study was to understand the student-athlete experience for women during the 1950s and 1960s as it related to scholarships, travel to competitions, and their perceived value to their respective institutions. A second purpose was to examine the

factors that allowed for the acceptance of women's track and field for Black women at HBCUs, while it was considered an improper activity for White women.

Method

Research

Historical research was conducted to find information on the HBCUs student-athlete experience in the sport of track and field. For this study, a descriptive research design was followed because historical data provided information about the topic. Guided by previous historical research, social learning theory, and researcher observations, the researchers developed a data collection protocol. Using an archival retrieval method, the researchers gathered historical data from Internet resources. The researchers first sought out electronic media guides and biographies from the college athletic department sport information website. If the data were not obtainable directly from the school's athletic department website, both online newspaper articles and college reference websites were used. The research was not focused on any one journal or database; many search terms were used to find information about the questions that were posed. Additionally, Google Scholar and even YouTube were used to find primary and secondary sources. The website database of *The New York Times* was used to search for sports reports from the time period, a few of which required a fee for access. The following terms were used in the search: *Tuskegee, Tennessee State University, Tigerettes, Tigerbelles, track and field, Black women athletes, AAU, women physical education,* and *Black womanhood.* The researchers' university institutional review board approved all of the procedures.

Data Analysis

Interpretation of historical studies includes attentiveness to themes, terms, descriptions, idioms, cultures, and relationships that build upon or illuminate theories. All data were prepared and downloaded into the qualitative software NVivo 10. Data analysis was facilitated by reading and rereading. The content analysis included response review, identification of themes, and classification of responses according to the identified themes, thereby giving voice to the viewpoints expressed regarding the emergence of women's track

and field at HBCU. The researchers discussed and co-constructed the themes. To establish reliability, three coders completed an intercoder reliability assessment according to accepted practice and coded a sample of 10% of the qualitative data. Intercoder reliability was determined via kappa analyses ranging from .80 to 1.00 for all variables, well above the standard threshold (.70) for acceptance.

Results and Discussion

There is a dearth of scholarly information explaining the student-athlete experience of Black track and field athletes at HBCUs.

Student-Athlete Experience

Tigerettes Coach Cleve Abbott and Tigerbelles Coach Ed Temple came to prominence before the NCAA established a stranglehold on all of collegiate sport. While several organizations sought to reign in and scale back women's collegiate sport, these legends were busy creating a dynasty. This accomplishment is even more impressive at a time when women's sports, especially track and field, were on the margins of American culture. Though the number varies from source to source, Coach Temple's budget for his women's track and field program ranged from $150 to $350 ("Ed Temple," n.d.). Even in 1954, when Coach Temple took over as head women's coach at TSU, this was not much to go on considering the expenses involved in running a program, no matter how small it started out. The operating expenses for TSU's women's track team in 2015 was better at $110,591 ("Tennessee State University," 2015).

Because so few other schools competed in women's track and field at this time, competitive opportunities for Black women's track and field athletes were limited. These competitive opportunities usually consisted of one or two meets a season: the Tuskegee Relays and the AAU National Championship. Being in Alabama, the Tuskegee Relays was not a large financial burden on the program, but the AAU Championship meets were held all over the country at this time. The meet was held in Harrisburg, Pennsylvania, in 1954; in Ponca City, Oklahoma, in 1955; in Washington, D.C., in 1956; and in Shaker Heights, Ohio, in 1957 (Tricard, 1996). Going to these meets required extensive travel for the Tigerbelles, usually done by station wagon because the budget did not allow for a chartered bus. During the time of Alice Coachman at the Tuskegee Institute, travel to competi-

tion was done by automobile and the athletes took food with them in the car because of limited chances to stop for food (Lansbury, 2014).

Traveling to competitions in the segregated South presented its own problems. Coach Temple had come to TSU from Pennsylvania, so the culture shock was a bit more pronounced for him, as well as for his girls who came to TSU from Northern states (Hargett, 2015). Coach Temple and his girls avoided stopping in small towns to search for facilities for "coloreds" and instead would pull off to the side of the road and go to the bathroom in wooded areas or in fields. For these same reasons, stopping to eat at a restaurant was also an issue. Despite these roadblocks, the Tigerbelles managed to persevere, winning their first AAU National Championship in 1955. Coachman recounted that in her days as a Tigerette at the Tuskegee Institute, there were no fancy hotels on road trips. Coachman and her teammates used the "Tuskegee Machine," a network of alumni around the country that would allow them to stay in their homes on track trips.

One of the objections that female physical educators had to women's collegiate sport was that it would suffer the ethical crisis of men's sport. This fear of ethical crisis affected scholarships. At the time, there were no scholarships for female athletes, and Coach Temple needed something to entice these women to run for him at TSU, especially given that the majority of them came from limited means. He ingeniously came up with a work–study program for his best athletes, in which they would work in TSU's post office in exchange for free tuition. This was the only way many of these girls had a chance at an education. Today, thanks in large part to Title IX, 18 full scholarships are available to NCAA Division I female athletes in the sport of track and field.

Coach Cleve Abbott of Tuskegee and Coach Temple had a summer running program that they used as a recruiting tool. At the time, there were few interscholastic opportunities for Black students to compete against each other, but the Tuskegee Relays included senior and junior divisions of their events. This provided an ideal opportunity for Coach Temple, and Coach Abbott before him, to recruit athletes from the Tuskegee Relays. He would then invite the athletes to his summer program, which was intensive and regimented. Coach Temple would make his girls train three times a day during this sum-

mer program, and most of his athletes said that it was a brutal schedule to follow. However, most of the athletes still came to TSU when it was time to start college. The closest that current sport can come to Coach Temple's summer running program is to hold a summer camp or clinic, which would be comparable to Temple's program. The main difference, however, is that Coach Temple and Coach Abbott recruited athletes to their summer program; the NCAA does not allow coaches to do that anymore. Another major point of differentiation between HBCUs at this time and now is that students such as Coachman were allowed to transfer to HBCUs such as Tuskegee Institute as high school seniors. This gave coaches more time to work with these pupils.

Acceptance of Track and Field at HBCUs

The first president of Tennessee A & I, William Hale, enforced a fairly conservative environment on his students, staff, and faculty as a contrast to the ambitious and rigorous academic environment provided. Students were required to attend university church services and work an institutional job for 2 hours each day (Lovett, 2005). All parties had to obey a curfew and refrain from involvement in political activities. These demands might seem formulated by a man who wished to exercise ultimate control over others, but the reality was more that President Hale wanted to ensure the success and survival of his institution during a time in history that was challenging, racially and economically, by decreasing the likelihood that someone affiliated with the university might cause strife.

Hale was not eager to endorse sports for Tennessee A & I, in large part because of his very small budget that precluded the adoption of the major sport of the day, men's football. Also, Hale opposed intercollegiate sport to avoid some of the negative press of the day pertaining to recruiting practices, injuries of athletes, and other ethical and moral quagmires that developed from intercollegiate competition in football. However, Hale was willing to endorse and support athletic teams and physical education for Tennessee A & I because it fit in with his endorsement of "Muscular Christianity." President Hale was able to accomplish three goals by providing intercollegiate sports at Tennessee A & I: recruitment of students, creation of school pride and unity (which produced alumni who could donate), and

finally, these athletic contests served as a diversion for students to keep them on campus where they were safe (Miller, 2002).

Hale's successor, Walter S. Davis, was ambitious about promoting athletics at Tennessee A & I, but his addition of women's track and field likely reaped the most rewards for the university, by this time known simply as TSU. The primary motivation for Davis' addition of men and women's track and field was the structure of their championships, which had not adopted or embraced segregated competition at the highest levels of the sport. Where the sports of basketball and football had been forced to have limited competitive opportunities because of segregation, track and field would be an opportunity for TSU to truly let the world see how good it was, because no athletes would be limited to only compete against their race. This would present an ideal opportunity for Davis to change perceptions across the country about Black athletes. These contests would prove to be culturally liberating for Blacks, especially in the Jim Crow South (Hodge, Harrison, Burden, & Dixson, 2008; Wiggins & Miller, 2003).

In effect, TSU's status as an HBCU insulated the Tigerbelles from undue scrutiny that they would have likely encountered outside the campus nest. The early adoption of conservative values and norms by President Hale also likely played a part in the acceptance of women's track for the world beyond TSU. Students were made to conform to norms and values that they might not have otherwise held, which made them appear "safe" when they were presented to the outside world. The Tigerbelles coach, Temple, also had a strict code of conduct that the Tigerbelles were to follow to be a part of his team.

Much like the first president of TSU, Coach Temple required curfews for his athletes, forbid them from riding in cars, required strict decorum outside of training and competition, and had no tolerance for tardiness. Coach Temple was often fond of telling his recruits, "There's the right way, the wrong way, and Coach Temple's way" ("Ed Temple," n.d., Coach Temples Way section, para. 1). Willye White was an athlete of Coach Temple's who had more trouble following the rules than most and was kicked off the team because she, in her own words, "was too much of a free spirit for that" (Lipsyte, 1993, para. 12).

It is well documented from interviews with many of Coach Temple's athletes, and from the man himself, that he demanded that

his athletes present themselves as ladies above all their other roles (athlete, student, etc.). Coach Temple is often quoted as having said, "I don't want oxes; I want foxes" (Hargett, 2007). He also had specific guidelines for how he expected his girls to present themselves for interviews postrace: "I want you to wipe your face, comb your hair and put some lipstick on so you look presentable when someone interviews you" (Hargett, 2007). Additionally, Coach Temple was also adept at promoting the femininity of his athletes to the press when he was interviewed about them. In one resource, Tigerbelle Barbara Jones was described as "attractive, charming and effervescent" (Lansbury, 2014, p. 133). The popular ladies attire for the day consisted of dresses with gloves and a hat, and Coach Temple required that his athletes keep a dress cleaned and pressed to be ready for public appearances or travel (Lansbury, 2014). The beauty norms of White women dictated how the Tigerbelles were to look if they hoped to be accepted in to the culture of the time. This is evident in the ads that ran in *Ebony Magazine* alongside articles about the success of the Tigerbelles in the 1950s and 1960s. These ads ranged from skin lightener to cookware. Coach Temple and the TSU Tigerbelles successfully used the norms of White hegemonic femininity to their advantage to spur the popularity of women's track and field. This became even more obvious when publications of the time began to tout participation and competition in track and field as a means of staying trim and attractive to the opposite sex. One knows that femininity has gone to the lighter side of the racial spectrum when talk about how woman can diminish her size and increase her frailty begins.

Leading up to the 1960 Olympic Games in Rome, there was a flood of sports reporting, much of it decrying the role of women at the Games. Writers such as William Barry Furlong still espoused the views that some sports ruined the typical perception of the female body and temperament (Pieper, 2016). Opinions such as Furlong's almost always had to do with what White, middle class society defined as beautiful. Participation in these fringe sports would ruin their position as a conduit for male pleasure.

It also helped the image of American women's track and field to be competing against the Russians during the Cold War. The Russians conveniently provided the public with an "other" to focus their attentions on instead of these young Black women competing in track

and field. The federations of the United States and Russia organized a series of dual meets to take place. The American men's team could make quick work of the Russian men's team, but the United States women had more difficulty, even with Wilma Rudolph leading the women's team. The Russians were the new muscle Molls and proved to be a formidable opponent for the young ladies of the U.S. team. The credo of "ladies first, track girls second," coupled by the societal norms of the time, came back to bite Coach Temple; women were not staying in the sport long enough to be competitive with the Russians, because they were out getting husbands, and the sport lacked ample competitive opportunities for women at the time. It then became the patriotic duty of men to not date or wed these women so that a strong team could be built for the 1964 Olympic Games. Through these efforts and the sprinting prowess of Rudolph, European meet organizers began to open their competitions to women.

Rudolph's spectacular 1960 Rome Olympic Games performance was the catalyst for these new thoughts about women's track and field. In the Rome Olympic Games, Rudolph won a stunning three gold medals and solidified the view that track and field could be a sport for feminine ladies. By the time Rudolph won those medals, she had been indoctrinated into the Coach Temple Way for 5 years and was always sure that she presented the impeccable image of a lady on and off the track. After Rudolph broke the record in the 200-meter dash in the preliminaries in Rome, her teammate Barbara Jones rushed out to give her a comb to make sure her hair looked good before she gave an interview (Lansbury, 2014). The Italian press in Rome loved Rudolph, giving her the nickname of "La Gazzella Nera" or "The Black Gazelle." Although this nickname implies a certain level of femininity and grace, it also reinforces stereotypes of Blacks as being animalistic. This categorization of Black athletes with animals trivializes their talent and determination to better themselves and promote their race through athletics and instead reinforces the stereotypes.

The stereotypes surrounding Black women were sometimes reinforced by their participation and success in athletics. Their history as slaves disqualified them from the hegemonic feminine ideal of the delicate damsel. The main caricatures used to justify the participation and success of Black women in sport are Mammy and Jezebel.

Black female athletes suffer the Mammy caricature because of their ability to bear a high amount of physical labor and suffer the Jezebel caricature because of the sexual deviance that vigorous physical activity was thought to create, at that time (Cahn, 1995).

> Their [White men's] racialized notion of the virile or mannish Black female athletes stemmed from a number of persistent historical myths: the linking of African American women's work history as slaves, their supposedly 'natural' brute strength and endurance inherited from their African origins, and the notion that vigorous or competitive sport masculinized women physically and sexually. (Vertinsky & Captain, 1998, p. 541)

The racial climate of Rudolph's time, coupled with the gender and class pressures placed on her, and others like her, demanded that a new space be created for Black female athletes. It became a vital characteristic for these women to maximize their gift to gain some control over who they were.

Once again, women's track and field, and the sport in general, has been placed back on the margins of American psyche and culture. This work gives an idea about the possible causes for this decline on the women's side in the 1920s, but it is doubtful that the current decline is related to the same factors. A separate inquiry would need to be made to investigate the decline in favorability of track and field for men at this time. Coaches in the sport of track and field often remark that on the men's side, its best athletes end up in either basketball or football because of the earnings potential versus track and field. Another factor is the attention paid to basketball and football versus track and field at the collegiate level. Additionally, the scholarship opportunities in football and basketball far outweigh those in track and field.

Limitations

This study has some primary limitations. By gathering historical data, the researchers were not able to capture directly several relative participation and coaching experience factors (e.g., mentorship, leadership skills, and social and political contexts) in the data. A number of factors limited the scope of this study, most notably

the time deadline, the principal researcher's 60–80-hour-per-week job, and the coauthors' growing interest in the subject area that led the researchers down rabbit hole after rabbit hole in search of more information. It is highly likely that rudimentary knowledge and understanding of historical research also hindered the process, as the secondary researcher lacked the understanding of the importance of visiting an archive or of how to search historical databases effectively. The limited library holdings of the principal researcher's university also limited the scope of this work.

Recommendations for Future Study

This study merits further inquiry with the implementation of Title IX and its effect on women's collegiate athletics and with the influence of the NCAA on the athletic teams at HBCUs. No longer the athletics powerhouses they once were, HBCUs have been mostly relegated to a second-class status within collegiate athletics. It would be an interesting case study to see how current TSU women's head coach, Chandra Cheeseborough, is managing her athletes, as she was one of Coach Temple's girls. To hear what she feels are the main roadblocks to TSU regaining its status in the women's track and field realm would be interesting as well.

The final aspect of this topic that merits further study is the acceptance of feminine norms among Black track and field athletes, as well as current public perceptions of the sport. Such analysis proves to be especially difficult considering that the role of the Black female athlete is unique, as she falls into three categories (of varying degrees at different times), all with their own baggage: Black, female, and classed (Vertinsky & Captain, 1998).

Conclusion

The TSU Tigerbelles and Tuskegee Institute Tigerettes occupy a special place in history, not only for their athletic achievements, but also for their contributions to the social discourse on the acceptance of Black female athletes in a "masculine" sport. The student-athlete experience for the TSU Tigerbelles in the 1950s and 1960s was a different experience than what athletes experience today. In the climate of racial strife of the Jim Crow South and the economic status of women's sports, the coaches and athletes of TSU had to make extreme sacrifices to compete in the sport they loved—track and field.

These talented young women exhibited the perseverance and resilience characteristic of their Black womanhood.

Alice Coachman of the Tuskegee Institute was the first Black woman to win an Olympic medal and was the only Black female medalist at the 1948 Summer Olympic Games in London, England. Barbara Jones of TSU is still the youngest woman to have ever won an Olympic medal at the tender age of 15. Willye White of TSU was the first American woman to compete in five consecutive Olympic Games. Tigerbelle Wilma Rudolph became the first American female athlete to win three gold medals in a single Olympic Games. Wyomia Tyus became the first athlete, male or female, to win consecutive Olympic gold medals in the 100-meter dash. Finally, Madeline Manning of TSU was the first American woman to win a gold medal in the 800-meter run (Binkley, Mitchell, & Mielnik, 2012). These women are just a part of the legacy left behind by these outstanding track and field programs. May their contributions to the sport and to the advancement of Black women not soon be forgotten.

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YOU AND THE LAW

Oops! Analysis of a Slip and Fall Hazard

Drake E. Belt and Sarah J. Young

City of Corpus Christi v. Ferguson
2014 Tex. App. LEXIS 1299

In December 2009, Janette Ferguson traveled to Corpus Christi, Texas, to participate in the Harbor Lights Festival boat parade. The day prior to the festival, Ferguson spent the night on her family's sailboat that was kept in a slip on the city marina's *C* pier. Upon waking the following morning, Ferguson walked to the marina's bathroom facility to take a shower and was returning to her family's sailboat when she slipped and fell on a sheet of ice after passing through the pier gates. Apparently, marina employees had drained the water from a hose overnight to prevent the water line from freezing, and employees claimed that signs were placed around the facility warning marina users of this circumstance. Ron Hebert, who leased a slip on the same pier, observed the spigot on the morning of Ferguson's accident with water trickling out of it and alerted marina employees that ice had formed at the gate. The City disputed Hebert's claim in that he had failed to check in with the marina office upon arrival that evening; therefore, he could not have alerted the employees of the hazard.

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The Complaint

Ferguson sued the City of Corpus Christi for general and gross negligence as well as premises liability.

Findings

The City responded to the plaintiff's claim by filing a dilatory plea to the jurisdiction claiming that it was immune from Ferguson's lawsuit under the sovereign immunity statute. Texas sovereign immunity is well established in protecting governmental entities from lawsuits. However, the Texas Tort Claims Act (TTCA) "provides a limited waiver of sovereign immunity" (p. 7) in three scenarios, one of which is premises defects, which was applicable to this case. Further, when a premises liability claim is made, the TTCA applies the state's recreational use statute as a way for the governmental entity to benefit from its limited liability. Therefore, the City of Corpus Christi appealed the trial court's denial of its plea to the jurisdiction, claiming that when she fell at the marina, Ms. Ferguson was engaged in a recreational activity.

The main question for the Court of Appeals of Texas was whether the plaintiff was engaged in a recreational activity at the time of her injury. The City claimed the plaintiff was engaged in a recreational activity, whereas Ms. Ferguson asserted that her need to walk to the shower was a "matter of necessity, not leisure" (p. 12). The Court relied upon *City of Bellmead v. Torres* (2002) as the legal precedent in determining whether a particular activity is recreational. Specifically, the determining factor hinged on "what the plaintiff was doing at the time" (p. 9) of her injury. Because the plaintiff had been engaged in boating activities, the Court determined that she was engaged in a recreational activity. Therefore, under the Texas recreational use statute, the City owed the plaintiff the same standard of care as that owed to a trespasser, unless evidence of gross negligence could be presented.

The Court of Appeals next reviewed whether Ms. Ferguson had demonstrated gross negligence on the part of the City in maintaining the marina premises. The City knew the air temperature on the night of December 4 was going to drop near or below freezing or they would not have drained the water lines at the marina. Specifically, the spigot near the pier gate had been opened, resulting in a trickle

of water flowing from it creating the patch of ice. Moreover, the City posted signage notifying users of the marina that the water lines would be drained, but failed to anticipate that the draining water might freeze on the pier and create a slip hazard. As a result, the City had actual knowledge of freezing conditions and subjective knowledge of the creation of an extremely risky hazard on the pier. Further, the City had time to remedy this situation as per Ron Hebert's call to the marina office, but failed to do so. Because of these facts, the Court ruled that the plaintiff had provided sufficient evidence of gross negligence.

Verdict

The Court of Appeals of Texas, 13th District, concluded that the trial court did not err in denying the City's plea to the jurisdiction. While the plaintiff was engaged in a recreational activity, the City was also grossly negligent in its maintenance of the pier. This outcome annulled the City's efforts to seek legal shelter under the TTCA and the Texas recreational use statute.

Key Terms

- Dilatory plea: A plea that seeks to delay or defeat the action on procedural grounds (Garner, 2014, p. 1337).
- Plea to the jurisdiction: A preliminary challenge to a court's authority to decide the action before it. In the state of Texas, the standard for a plea to the jurisdiction mirrors that of a traditional motion for summary judgment (*City of Fort Worth v. Robinson*, 2009).

Implications

This case highlights the importance for public municipalities to have clear standards in place to avoid situations that create an environment in which users could be injured. Further, it is important to have these standards and protocols in place for facility inspections, check-in procedures, signage, and response to risk hazards.

Procedures are necessary to maintain a reasonably safe environment, especially in a facility in which water is involved. For recreation and sport organizations, it is crucial to maintain consistency in creating standard procedures and managing a safe facility. Implementing a member sign-in or card swipe entry is an example of

an efficient and organized method to help ensure which participants are in the facility. However, if the protocol is not consistently enforced and users are able to check in after spending the night or participating in recreational activities, a breach of security has occurred. Having clearly documented records with consistent enforcement of the standard procedures allows an organization to use documentation should any legal issue arise. Falling below the standard places in question the integrity of all documentation within an organization. In other words, if a facility cannot accurately document who is inside the facility, all other documentation may be questioned or not taken seriously. Training staff members to consistently enforce facility policies allows all employees and users to have a greater understanding of the process. Moreover, it is important for a facility to always maintain a staff presence at the front desk/check-in area and not allow participants to enter without the proper check-in procedure. In this case, the marina did not consistently follow the check-in procedure by allowing the marina patrol to go on rounds, leaving the front desk unattended.

Facility inspections are also a critically important aspect for an organization to adopt and conduct. Patrols and routine walks around a facility are great times to initiate inspections, to ensure the facility is being safely maintained, and to identify risk hazards, such as a hose leaking water onto a pier or deck. Additionally, facility inspections help document a facility's condition and act as credible evidence should the integrity of the organization come into question in court. Coupled with facility inspections, procedures need to be created to indicate critical risks and have policies in place to rectify identified issues, if and when they are discovered. For example, in this case, once it was recognized that freezing temperatures were imminent, the City needed to take steps to ensure the pier was free of water or that an additional path to the showers was identified and marked so patrons were aware of the changes. Further, signage needs to be placed appropriately in a visible location for all participants to see. If the sign is warning of an unsafe condition occurring overnight, it is important to ensure the sign is well lit throughout the nighttime hours.

Beyond signs, there should be additional methods to notify users of risk issues to avoid problems with language barriers, reading levels

based on education or age, and those with disabilities who may not be able to identify risk via signage properly. Social media has been widely adopted via the public and is an emerging technology that allows organizations flexibility and adaptability in their responses. It has been demonstrated that social media platforms have the ability to coordinate widespread communication and to strengthen information flows. Social media can also be employed to support faster decision cycles and contribute to effective knowledge management (Yates & Paquette, 2011). Organizations use of social media to improve their communication with participants to disseminate vital information to a large population in a relatively short time.

All responses to risk hazards need to be quick, be efficient, and adhere to established standards. Having staff members present at a facility during all hours users are present will help increase response times and decrease potential risks. Situations will arise and not all accidents can be avoided, but there are many procedures that can be in place to help eliminate unnecessary harm.

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The Physical Educator

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