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IMPACT OF PHYSICAL EDUCATION

School Principals' Perceptions of and Expectations for Physical Education

Meredith L. George and Matthew D. Curtner-Smith

Abstract

The purposes of this study were to (a) examine 19 school principals' perceptions of and expectations for physical education (PE) and (b) describe the factors influencing school principals' perceptions of and expectations for PE. We collected data using an electronic survey that included questions on (a) the goals of PE, (b) pedagogies and curricula, (c) evaluation practices, (d) expectations for learning, (e) value of PE and extracurricular sport, and (f) factors within principals' pre-training biographies and training that shaped their beliefs and values about PE. We analyzed data using constant comparison and analytic induction. Principals had a limited understanding of the goals of PE, its curricula, and its pedagogies because their beliefs about the subject were largely shaped by their own experiences of PE and sport when they were children and youth rather than any formal training that they had received.

Previous research on school principals' thoughts, perceptions, and views about physical education (PE) is limited. Much of the interpretive work conducted with young in-service PE teachers, however, suggests that the majority of principals have a poor understanding of the subject's goals, pedagogies, and curricula; do not regard it as being on the same level as other "academic" subjects; and see little educational value in it other than to keep students under control and entertained while teachers of other subjects take

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a break (Curtner-Smith, 1997, 1999, 2001; Curtner-Smith, Hastie, & Kinchin, 2008; Lee & Curtner-Smith, 2011; O'Sullivan, 1989; Smyth, 1995). In addition, there is some indication that principals are more concerned about PE teachers' ability to coach extracurricular sport than their capacity to teach PE (Dillon, McCaughtry, & Hummel, 2010). Furthermore, principals with these faulty perceptions regarding PE are more likely to offer exemptions to the subject, even if they are trained physical educators themselves (Sims, 2003).

Conversely, some research indicates that more enlightened and knowledgeable principals positively affect PE teachers' beliefs and curricula, providing that the teachers are innovatively oriented (Bechtel & O'Sullivan, 2007). Moreover, there appears to be a positive relationship between the extent to which principals support PE programs and the degree to which PE teachers follow state-mandated curricula and requirements (Sims, 2003).

Given principals' obvious influence on the teaching of all school subjects and their duty to hold teachers accountable for delivering a high class curriculum, a potentially fruitful area for policy-oriented researchers hoping to improve the standard of PE is further investigation of how principals interpret, "read," or perceive the subject (Curtner-Smith, 2009). The purposes of this study, therefore, were to (a) examine school principals' perceptions of and expectations for PE and (b) describe the factors influencing school principals' perceptions of and expectations for PE.

Theoretical Framework

In prior sport pedagogical research, occupational socialization theory (Curtner-Smith, 2009; Richards, Templin, & Graber, 2014; Templin & Richards, 2014) has generally been used to explain the beliefs and actions of teachers (e.g., Curtner-Smith et al., 2008; Vollmer & Curtner-Smith, 2016). Within this study, however, we employed it in an attempt to explain school principals' readings of and expectations for PE. Specifically, in line with the thinking of Gore (1990), we explored how principals' beliefs about PE and the degree to which they value the subject were shaped by their *acculturation* (i.e., social and cultural influences prior to teacher education) and *professional socialization* (i.e., the influence of their formal teacher education and administrative training).

Past research suggests that the views of key socializing agents including parents, siblings, and peers are responsible for shaping future principals' values during the acculturation period. This research also suggests that future principals' own schooling, particularly their experiences of PE and school sport, is a major influence on their beliefs about the subject. For example, experiences during this "apprenticeship of observation" (Lortie, 1975) could lead to principals forming the view that PE is either a high or low priority subject and deciding what constitutes good or bad pedagogical practice within the subject.

Past research also suggests that future principals' professional socialization will have less effect on their values and beliefs about PE than acculturation will. Conversely, the degree to which future principals undergo specialist training in PE teaching during their initial undergraduate preparation, in any graduate work in a teaching field, and in administrative certification courses should increase the potential for alteration of beliefs about the subject that were formed during acculturation. High quality PE teacher education (PETE) is more likely to lead to the subject being valued by future principals and their improved understanding of its curricula and pedagogies. Low quality PETE is more likely to have the opposite effect.

Future principals who are initially trained as PE teachers and those who are trained to be elementary teachers and take a PE methods course (Xiang, Lowy, & McBride, 2002) are more likely to change their beliefs and values about the subject than are those who are trained to be secondary teachers in other subject matters. However, in their portrayals of PE, faculty who are responsible for preparation in these other subject matters may exert an overt or unconscious influence on their charges, which may serve to devalue or promote the subject (Curtner-Smith, 2007).

Method

Participants and Setting

Participants were 19 principals working in two school systems within one state in the southeastern United States. We purposefully selected these school systems because they included schools that catered to a wide range of students in terms of socioeconomic status and race. Each principal gave informed consent in congruence with

the requirements of the university's policy for conducting research with human subjects. Each principal was also assigned a pseudonym.

Table 1 shows key demographic and biographical data for these principals. Ten of the principals were between 35 and 44 years of age, five were between 45 and 54 years of age, three were between 55 and 64 years of age, and one was under 34 years of age. Twelve of the principals were female and seven were male. Seventeen were Caucasian and two were African American. Eight worked at elementary schools and 11 worked at secondary schools. Finally, only two of the principals were trained and certified to teach PE.

Table 1
Key Demographic and Biographical Details for the Principals

Principal	Age range	Gender	Ethnicity	Grade level taught	PETE (yes/no)
Rachel	35–44	Female	Caucasian	Secondary	No
Nathan	35–44	Male	Caucasian	Elementary	No
Michelle	55–64	Female	Caucasian	Elementary	No
Becky	55–64	Female	Caucasian	Elementary	No
Alan	45–54	Male	Caucasian	Secondary	No
Sarah	35–44	Female	Caucasian	Secondary	No
Darby	45–54	Female	Caucasian	Elementary	No
Randal	45–54	Male	Caucasian	Secondary	No
Norma	45–54	Female	Caucasian	Secondary	No
Tracy	35–44	Female	Caucasian	Elementary	No
Bobby	35–44	Male	African American	Secondary	Yes
Beth	55–64	Female	Caucasian	Elementary	No
Brandon	35–44	Male	African American	Secondary	No
Taylor	25–34	Female	Caucasian	Elementary	No
Hannah	35–44	Female	Caucasian	Secondary	Yes
Ryan	35–44	Male	Caucasian	Secondary	No
Craig	45–54	Male	Caucasian	Secondary	No
Grace	35–44	Female	Caucasian	Elementary	No
Kim	35–44	Female	Caucasian	Secondary	No

Additional demographic and background data gathered during the study indicated that 18 of the principals had received the majority of their formal education in the Deep South and one had

trained in the Midwest. Two of the principals had earned doctorates. The highest level of education achieved by the remaining 17 principals was the educational specialist degree (n = 12) and the master's degree (n = 5). Of the 17 principals not trained to teach PE, four had been certified as elementary teachers, two had been certified as early childhood specialists, and 11 had been trained to teach a variety of secondary subjects. All six of the principals certified to teach at the elementary or early childhood level had also taken one university course designed to give them some knowledge of PE pedagogy.

Data Collection

All 19 principals completed a 21-item survey online using Survey Monkey (2012; see Table 2). Section A of the instrument was designed to generate demographic and biographical data. Section B included open-ended questions aimed at gaining data about principals' beliefs and values regarding PE. Specifically, principals answered questions about the goals of the subject; its pedagogies and curricula; its evaluation practices; what, if anything, they expected children and youth to learn from the subject; and the degree to which they valued curricular PE and extracurricular sport in their schools. Sections C, D, and E of the survey included a series of open-ended questions drawn from the literature on occupational socialization and was designed to discover the factors within principals' professional socialization (Section C) and acculturation (Sections D and E) that shaped their beliefs and values about PE.

Table 2
Principals' PE Survey

Section and questions
A. Background information
1. What is your age?
2. What is your gender?
3. What is your nationality?
4. What is your ethnic origin?
5. In which state did you receive the majority of your formal schooling?
6. Please list your formal postsecondary school educational qualifications starting with your bachelor's degree.

Table 2 (cont.)

Section and questions
B. Your current views and beliefs about PE
7. In the space below briefly describe what you believe the goals of your school's PE program to be.
8. In the space below briefly describe the key teaching skills a PE teacher should possess.
9. In the space below briefly describe the key elements of an excellent school PE curriculum.
10. In the space below briefly describe how children and youth should be evaluated in PE.
11. In the space below briefly explain how important you believe PE is compared to extracurricular school sport.
12. In the space below briefly explain how important you believe PE is compared to other school subjects that students at your school are required to study.
C. Your views on and experiences of PE during your initial teacher preparation
13. In the space below list the subject matter(s) that you were initially trained to teach?
14. In the space below briefly describe the extent to which those who trained you to teach valued PE.
15. During your teacher preparation program, did you receive any training in teaching PE? If yes, please describe the training briefly in the space below.
16. During your formal training to become a principal, did you receive any training in the supervision and support of PE programming? If yes, please describe the training briefly in the space below.
D. Your own experiences of PE and sport when you were a child/youth and as an adult
17. In the space below briefly describe your own experiences of school PE when you were a child and youth, emphasizing aspects that were positive (if any) or negative (if any).

Table 2 (cont.)

Section and questions
18. In the space below briefly describe the extent to which you participated in extracurricular sport at school and formal sport outside of school when you were a child and youth, emphasizing aspects that were positive (if any) or negative (if any).
19. In the space below briefly describe the extent to which you participated in informal physical activity and sport outside school when you were a child and youth.
20. In the space below briefly describe the extent to which you have participated in sport and physical activity as an adult.
E. Participation levels and views of others
21. In the space below briefly describe the extent to which your parents, siblings, and peers participated in physical activity when you were a child and youth.

Note. PE = physical education.

Data Analysis

Data that indicated how principals perceived PE and what expectations they had for the subject were identified, coded, categorized, and reduced to meaningful themes through analytic induction and constant comparison (Goetz & LeCompte, 1984). These techniques were also employed to reduce data identified as explaining how and why principals had been socialized into thinking about PE in the ways that they did. Credibility and trustworthiness of the analysis was established through the search for negative and discrepant cases (Goetz & LeCompte, 1984). In addition, during the analysis process the second author served as a "critical friend" (Costa & Kallick, 1993) for the first author, who carried out the main analysis. Specifically, the second author examined and critiqued the analysis at regular intervals, discussed it with the first author, and debriefed her during the writing and editing of the manuscript.

Findings and Discussion

Principals' Perceptions of and Expectations for PE

Goals of PE. The key focus of the principals in this sample was one of the goals of PE: health-related fitness. Specifically, they emphasized that "lifelong fitness," "healthy lifestyles," "wellness," and "general health" should be "promoted" within the subject. Students, they thought, should acquire the knowledge necessary to "create a sense" of health and wellness that they could "carry into adulthood" and should become "physically fit" and healthy by participating in at least a "moderate level" of physical activity during lessons. They also suggested that PE had a cathartic role in the lives of students, in that students needed to "release stress, and exercise, and physical activity is a wonderful place to do so." The following data extracts are typical of the principals' comments on this topic:

> The goal for our program is to teach kids the importance of good health and physical activity to take with them into their real-world experience. . . . All students can eat healthy and do some physical activity to stay healthy. (Ryan)

> I believe physical education programs assist in helping all students see the importance of health and wellness. This issue is a real issue that is affecting the national economy and the health industry. I feel students should be provided positive guidelines that promote healthy living, nutrition, and lifelong goals for fitness. (Kim)

A secondary and related goal for many of the principals was leisure education. Their initial aim was to "expose" students to "a wide variety of individual and group activities" to "allow them to discover their strengths" and "spark [their] interest" in and "enjoyment" of participating in "new and diverse activities" that they would "learn to love." Their ultimate objective was to instill in students the "passion to be active" "for life."

In addition, five principals also indicated that they thought personal and social development was a legitimate goal of the subject, describing it in terms of nurturing "sportsmanship," "teamwork," "interactive behavior," "making good choices," "respect for other stu-

dents," and "cooperation" through physical activity. References to the development of skillful movement or learning movement concepts were rare and, when they were mentioned, were restricted to "motor skill development," the "development of basic skills/techniques required for participation," and "skill mastery." They did not, however, reference students gaining knowledge and understanding of tactics and strategies of games and sports. Finally, although they did not directly reference the goal of cognitive development within and through PE, they suggested that PE teachers should be able to aid those teaching other subject matters by being proficient at "integrating other content areas" into PE instruction.

How to achieve the goals of PE. Despite their primary focus on health-related fitness, most principals favored the use of a traditional multiactivity curriculum in which students were "exposed" to a variety of sports, games, and traditional activities. In short, the curriculum they described was more suited to realize their secondary goal of leisure education. To this end, some principals noted that teachers needed to help their students develop a deeper understanding of the activities they were learning, to increase the likelihood that they would continue to participate. For example, they suggested that students be provided the opportunity to "master all objectives" within a variety of sports and activities while "having fun and learning to apply the skills to their individual lives." They suggested that this course of action would increase the likelihood of "lifelong participation."

The sports and activities they mentioned included soccer, basketball, volleyball, rhythm and dance, and badminton. Other than referring to "team and individual sports," they did not categorize these sports or activities as, for example, those that might appeal to different groups of students because of their characteristics (e.g., competitive sports, aesthetic sports and activities, target games, net/wall games, striking/fielding games, invasion games, outdoor and adventurous activities, water-based activities). The following data extracts illustrate principals' thoughts regarding the PE curriculum:

> [An excellent physical education program involves] a curriculum that embodies active exercise and knowledge surrounding diverse learning in regard to various sports and activities. The goals of a school's physical education program

should promote a healthy lifestyle and consistent exercise. (Brandon)

A comprehensive physical education program should provide all students with the skills and information needed to maintain an acceptable level of fitness for an entire lifetime. Sports programs are usually more narrowly focused toward the specific skill set needed or the sport or team activity. (Hannah)

In addition, they made few attempts at directly linking the exposure of students to these sports and activities to the goal of promoting health-related fitness. Eight principals, however, suggested that "healthy lifestyle choices" could be taught by requiring students to participate in a "variety of skills and activities" that would "keep [students] active and interested in physical fitness." Others emphasized the need for teachers to keep their students "involved," "moving," and "engaged" with "hands-on activities" during the majority of lesson time, indicating that their main emphasis was on being healthy and fit rather than knowing about health, wellness, and fitness. Pointedly, other than several suggestions that students learn about "stretching," "exercise concepts," and "healthy eating habits" and that teachers "provide positive guidelines that promote healthy living, nutrition, and lifelong goals for fitness," they did not describe and define the body of knowledge that should be taught as "health." Furthermore, they did not mention incorporating a classroom component within PE to teach this kind of knowledge.

Characteristics of effective PE teachers. Principals focused on four elements when describing effective PE teachers. These were teachers' character and behavioral traits, physical appearance and sporting skills, managerial skills, and instructional skills. Following Shulman (1986), we note an absence of references to teachers' curricular and pedagogical content knowledge and knowledge of students, and different purposes and philosophies about PE.

Character and behavioral traits. The majority of comments concerning PE teachers' effectiveness focused on character and behavioral traits as opposed to pedagogical skills or teaching behaviors. Principals suggested that effective teachers should be "motivating," "enthusiastic," "passionate," "empathetic," "patient," and "caring."

Moreover, effective teachers should be "effective communicators," "respect . . . the learner," and be able to form "a positive rapport with students."

Physical appearance and sporting skills. Two principals emphasized the need for a PE teacher to be fit and healthy and the importance of the teacher modeling a "physically active lifestyle." In addition, they suggested that PE teachers needed to be "able . . . to demonstrate appropriate skills and techniques." The following extract was typical of the comments about appearance, modeling, and sporting ability: "A PE teacher should . . . be willing to model and demonstrate skills, and be a model of fitness him/herself" (Darby).

Managerial skills. Principals also focused on the ability of the PE teacher to be an "effective behavior manager." Specifically, principals believed PE teachers should be able to "control," "monitor," "supervise," and "manage" "large groups of students" in a fast-paced and fluid environment. Managerial comments indicated that the principals valued PE teachers whose managerial behaviors enabled them to "create a positive learning environment."

Instructional skills. The principals made few comments about effective teaching behaviors, pedagogies, and skills. Nevertheless, a number of principals noted that to realize the goals of the subject, PE teachers needed to "understand teaching tactics" and "demonstrate the elements of effective instruction." These elements included "providing feedback," being a "reflective practitioner," possessing adequate content knowledge, "incorporating technology," and providing "learning goals that build on each other from unit to unit and year to year." The collective inference of these elements was that most principals favored the use of direct pedagogies. Two principals, however, indicated that they also believed that effective physical educators needed to be able to employ more student-centered, indirect, "inquiry-based" teaching styles and be able to "differentiate their instruction."

The principals' beliefs about what PE teachers should focus on when evaluating students varied. Relatively few suggested that PE teachers' focus should be on "what students should know and be able to do" in PE, including "the evaluation of physical performance" and "knowledge given to [students] by the instructor." Instead, the majority suggested that in PE the teacher should focus on evaluating the students' levels of "participation," "effort," and "cooperation."

The implication being that it was unfair to evaluate students in PE based on what they had learned: "[Students] should be evaluated by their effort to learn and try the skills that they are being taught. Not all students will be at the same level, but all students can try" (Ryan). In addition, the principals offered few suggestions regarding how effective PE teachers should evaluate their students, offering only "observation," the use of "rubrics," and "anecdotal notes" as specific examples.

Importance of PE. Despite evidence to the contrary, such as views about the focus of evaluation in the subject, 16 principals stated that PE was as important as other "academic subjects." Specifically, they noted that the subject was vital to the development of the "whole child" and "the overall success of the school program," because "a healthy body and healthy mind go hand in hand": "I believe physical education is just as important as any other class. I believe learning how to live a healthy lifestyle is an essential life skill" (Sarah). Further, one principal noted that despite her views about the importance of PE, she was forced to give priority to other subjects based on what those above her held her accountable for: "[PE] is important. It's hard to say how [important] when schools are judged on academics only" (Darby).

Conversely, one principal categorically stated that PE was less important than other subjects in the curriculum: "While academics should always come first, physical education is important and quality in physical education should be a part of the daily schedule" (Alan). Two principals also implied that PE was less important than other subjects by labeling it as a "non-academic subject," contrasting it with "academic subjects," and by stating its "importance" was only inferred because it was "a requirement for graduation."

Relative importance of PE and extracurricular sport. Although some principals recognized that extracurricular sport could be relatively narrow in scope because it "focuses on one set of skills," a theme running through many of the surveys was that extracurricular sport was more important than PE. For example, a number of principals appeared to contrast the needs of students they labeled as "athletes" (i.e., students who played on extracurricular school teams) and the rest of the student body. The implication within this contrast was that

by participating in competitive sport, athletes somehow gained the knowledge, skills, and dispositions they could be taught in a good PE class and that PE was for "unathletic students" who, quite rightly, did not participate in extracurricular sport. The principals extended this thinking, noting that PE was merely a "foundation" or feeder system for school sport because "it lays the groundwork for athletic teams," and that extracurricular sport was concerned with "excellence" in terms of "performance," whereas PE was not.

> If teamwork and sportsmanship are being instilled [in physical education], then it would greatly benefit extracurricular sports. Learning how to work cooperatively and how to manage one's self (both behaviorally and physically) will benefit students in all sports. (Grace)

> I believe physical education is a place for that student who may not be athletic enough to participate in an extracurricular sport, be given the opportunity to play a sport that he enjoys without the pressures of being good. The student is simply playing for the love of the game. I also feel athletics is important because it teaches life lessons and builds character and respect. (Bobby)

Differences between principals' perceptions of and expectations for PE. Although they were not mutually exclusive, some trends in the data suggested that some principals had different perspectives about and conceptions of PE than others. Specifically, younger females were more likely to express a concern for healthy lifestyles and lifelong fitness, particularly the amount and intensity of physical activity that occurred in lessons. Older males were more likely to focus on the goal of leisure education. In addition, younger principals were more likely to suggest that PE was for students who did not have the ability to participate in extracurricular sport and that extracurricular sport was only for "athletes." Moreover, elementary principals were more likely to focus on personal and social development and secondary principals were more concerned with health-related fitness and leisure education.

Factors Influencing Principals' Perceptions of and Expectations for PE

Acculturation. Principals' acculturation appeared to exert a powerful influence on their conceptions of PE. Key factors influencing their thinking about the subject were their parents, experiences of their own PE when they were children and youth, participation in school sport and informal activity when they were children and youth, and participation in sports and physical activity as adults.

Parents. Most principals relayed that their family, in general, and parents, in particular, instilled in them a love for physical activity and stressed the importance of being and staying active. One principal said, "Physical activity has always been important to my family. We always enjoyed playing outdoors and making things with our hands. We also thoroughly enjoyed water skiing, fishing, and swimming" (Alan). Another principal noted, "[My] entire family participated in some type of activity. [It was] expected and supported" (Craig). Even parents who "worked very hard" and had no extra time for "outside activity" still "encouraged" them to "be active" and participate in "physical activity on a daily basis" and "forced [them] to go outside and play regularly." For this reason, principals saw the potential for sport and physical activity to have a positive effect on their students.

Principals' experiences of PE when they were children and youth. Thirteen of the principals also reported having a "good," "positive," "engaging," enjoyable, and "fun" PE experience when they were children and youth. They remembered their PE teachers fondly, for example, recalling that "they set the mood for the school." These principals tended to have a relatively high value for PE. Moreover, the curriculum for which they advocated in their own schools, the goals for that curriculum, and the characteristics they valued in their PE teachers were virtually identical to those they had encountered when they were children and youth:

> I enjoyed learning the skills and playing the games. We also exercised every day. [I believe] the primary goal [of physical education] would be to develop active and healthful lifestyles to enhance the quality of life for each individual. [It should also] provide activities they enjoy, thus leading to learning the skills, and develop the knowledge and attitudes that will lead to enjoyment of physical activity for a lifetime. (Becky)

Conversely, six principals recalled having a negative experience during their own PE. Among their criticisms, they noted that "there should have been more direct instruction from the physical education teachers," that they could "not recall any instruction on how to play a game," and that they were told "here are the balls, go outside and play." Moreover, they also remembered "being anxious about picking teams," the failure of their teachers to provide "consistent" instruction, and not learning "lifelong fitness habits." One principal recalled not having PE at all "in middle or high school due to being in the band/majorette." As a result of her experiences, she was determined that what was delivered in her school in the name of PE would be superior in quality to what she encountered when she was a child: "PE should teach cooperation and teamwork; basic skills/techniques required for participation in lifelong activities. It should also promote healthy lifestyles. PE should also be required for people in the band" (Grace). Three principals, however, accepted that what they had suffered through was "normal" and so indicated that their value of PE and their expectations for the subject in their own schools were low:

> I hated PE. I was not a great athlete and we didn't do much in class. We got to walk around the track or choose the game we played. As long as we did some type of exercise, we got a good grade. I expect my own students to get their daily exercise and be well-supervised by the teachers. (Michelle)

Principals' experiences of school sport, organized youth sport, and informal activity. Most of the principals had participated in a good deal of informal physical activity when they were children. For example, they recalled "always being out in the yard playing ball" with siblings or "other kids in the neighborhood." Moreover, they realized and recognized that they were more physically active when they were children than the current generation. For example, they noted that their students were "not as actively engaged" as past generations and instead favored being "on the computer," "watching TV," or "playing video games." This appeared to be a key reason that they focused on health-related fitness, especially "being physically active," and leisure education within their school PE programs:

> Due to parents working all day and students staying at home by themselves, kids don't always go outside and play. They sit at the computer or watch TV. PE may be the only chance they have to get their daily exercise and learn to appreciate fitness. (Norma)

Most of the men and many of the younger women also recalled participating in extracurricular school sport and organized youth sport and physical activity with considerable "enjoyment" and "loving every minute of it." Men recalled participating in football, basketball, baseball, wrestling, and track. Women remembered participating in softball, volleyball, dance, cheerleading, karate, track, and tennis. The following extract was typical of their recollections: "I played rec league softball. I also earned a black belt in karate. I loved both activities" (Rachel). Moreover, these principals were enthusiastic about what they had gained from participating in sport. For example, they noted that "school sports teams were a vital part of . . . development as a student" and referred to lessons they had learned "for life and personal social skills" including "communication," "teamwork," "dedication," and "perseverance." These beliefs about organized sport clearly helped shape their views about the makeup of the PE curriculum and the relative value of PE and school sport.

Opportunities for one older female to participate in school and youth sport had been restricted because "youth sports were limited, especially for girls." This experience resulted in the principal giving PE more importance in her curriculum because she realized what she had missed.

Principals' participation in sport and physical activity as adults. All but two principals continued to participate in physical activity as adults. Some continued to play sports such as softball, basketball, and tennis. Others had moved to "fitness activities" including walking, running, weight lifting, swimming, and aerobics. Moreover, they were quick to explain their commitment to and enthusiasm for being physically active, noting that it was "great for relieving stress" and added "enjoyment" to their busy day. Again, it appeared as if their own commitment to health, fitness, sport, and physical activity played some role in shaping their views about the PE curriculum.

Professional socialization. In contrast to the powerful effect of their acculturation on their beliefs about PE, the influence of their

professional socialization in the form of PETE, other educational coursework, and specific training to supervise PE teachers was negligible and weak.

PETE. The two principals who had been trained as PE teachers had different experiences in their PETE programs. Bobby recalled that PE "was always considered a 'dumping ground' for students who could not find a class to take. . . . It was always just supervise them and don't let them get out of control. Do whatever you want down there." Conversely, Hannah recalled her PETE having "great value in the teacher [she had] become." In addition, she noted that she had learned "how to evaluate students," how to "come up with activities to keep students focused and engaged in learning," and how to "break down" skills and teach them.

The six principals who had been certified to teach elementary and early childhood confessed to not "remembering much" about the "few classes" that made up the PE component of their training. They did, however, recall being required to "write PE lesson plans," "trying to teach" from these plans, and "briefly" learning how to "monitor a large group of students." Not surprisingly, the data analysis failed to detect any more sophistication and depth in these principals' beliefs about, values for, and conceptions of PE than in the beliefs of those principals who had not received any specific training in PE.

Other educational coursework. Ten principals reported having "no idea" about or being "unsure" of their initial teacher education instructors' views and beliefs about PE. This suggested that these principals' own perspectives on the subject were neither positively nor adversely influenced by this source. Six principals, however, recalled hearing positive portrayals of PE from their education professors:

> Those who trained me had a lot of respect for physical education and valued that area. I believe we are all in the same "boat" when it comes to getting support for the two areas of band and physical education. We have to fight to show others the value of our programs. . . . When you look at those life learning skills that are taught in these activities such as teamwork, collaboration, discipline, organization, etc. you see the value in both. (Ryan)

In addition, three principals noted that their education professors "[living] healthy lifestyles themselves" suggested that they saw "physical education . . . as an important discipline." Collectively, the messages sent through these portrayals and examples would likely have shaped the principals' own views positively.

Training to supervise PE. Only three principals indicated that they had received formal training about how to supervise PE teachers in their schools during their preparation to become principals or within in-service programs once they had become principals. Those who had received training indicated that it was fleeting and consisted of "lectures" and some "short observations" of "effective programs." The main focus of this training had been on how "physical educators should supervise their classes" and "how to keep students active." The training focused little on curriculum or pedagogy.

The principals who had not received training noted that they coped with PE by relying on their past beliefs and values and extrapolating from other coursework within their programs: "I had no training in supervising PE [but I was] told [that] per 50 children [there should be] one adult and monitoring was a priority" (Tracy).

> There was not any specific formal training, but as I went through curriculum and supervision classes, I would always think how to use the supervision and evaluation techniques being taught and how they related to the non-academic subjects. Many times you can use the examples for a PE or band teacher as examples of excellent classroom management skills. (Ryan)

Conclusion

The main conclusion to be drawn from this study is that the principals who participated had a limited and superficial understanding of the goals of PE, its curricula, and its pedagogies. The key influence on their conceptions of the subject was their acculturation, most important their own experiences of PE and sport when they were children and youth. Conversely, their professional socialization had little or no effect on their beliefs about the subject because it was nonexistent, was weak, or served to support views they had acquired through acculturation.

Not surprisingly, therefore, the principals misconceived some aspects of PE and had faulty, conflicting, and contradicting ideas about other components of the subject. This faulty thinking and these misconceptions and contradictions were similar to those espoused by preservice teachers beginning their PETE (e.g., Sofo & Curtner-Smith, 2010) and by principals (e.g., Curtner-Smith et al., 2008) in previous research. For example, although the main goal the principals emphasized was health-related fitness, the curriculum they advocated was the short exposure multiactivity model rather than a true health-related fitness model. This version of the multiactivity model has been highly criticized in the sport pedagogy literature for achieving little in terms of learning in general, failing low-skilled boys and girls of all abilities in particular, being gender segregated, and allowing high-skilled boys to negotiate a curriculum with teachers that suits them to the detriment of their peers (Ennis, 1999).

In addition, the principals appeared to know little about the different curriculum models available to PE teachers to realize different goals at different levels of schooling or about the variety of pedagogies that they could employ in the PE setting. For these reasons, they implied that PE and extracurricular sport were synonymous but for different groups of students, they focused on PE teachers' character and behavior traits rather than their pedagogical skill, and they advocated that students be evaluated based on effort as opposed to learning or performance. If these findings transfer to other groups and locations, a major implication of the study is that the training for those intending to become principals needs to include a stronger PE component. Such training should focus on conveying the full range of potential goals for the subject and informing about curriculum models, specific pedagogies, and evaluation techniques. In addition, every effort should be made to change faulty beliefs.

Future research examining the degree to which the results of this study transfer would be useful. Although it was beyond the scope of this study, future work might also investigate the degree to which another form of socialization, organizational socialization (i.e., the influence of the school culture while teaching and administrating; Richards et al., 2014), interacts with acculturation and professional socialization. Researchers could, for example, attempt to discover if

specific school cultures "wash out" (Zeichner & Tabachnik, 1981) and counter or serve to support values and beliefs espoused in formal training. In addition, they might examine the influence of superintendents, teachers, parents, and children on principals' beliefs about PE.

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INTERSCHOLASTIC ATHLETICS

High School Academics: Increasing the Standard

Ashley N. Gard

Abstract

Beyond heightened academic requirements, student athletes face a multitude of tasks including weight training, practice, film review, and travel for competition. This makes the student's life complex. As student athletes progress through their educational experience, they experience higher structured time demands in regard to their sport participation, this being very true for college freshman. "Many studies over the past ten years have documented the disconnect between what high school teachers teach and what postsecondary instructors expect with regard to students' preparation for first-year credit-bearing courses in college" (Venezia & Jaeger, 2013, p. 119). As a result, states have adopted the Common Core in an attempt to level the educational field and prepare students for college rigor and their chosen career field. Meanwhile, the NCAA has also increased its initial eligibility rules to ensure incoming student athletes are ready for college rigor and athletic participation. However, the state and NCAA academic requirements have increased at different rates. As a result, student athletes are potentially unprepared for the academic rigors and challenges of college. In this study, I compared all 50 state course completion requirements to the 2014 NCAA initial eligibility standards. The results of this study show the specific qualitative differences in the interscholastic and intercollegiate academic requirements. Based on these differences, I provide recommendations of how interscholastic policy makers can adjust their academic requirements to align them better to those at the intercollegiate level.

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The challenges faced by student athletes are a growing concern in today's society. Beyond heightened academic requirements, student athletes face a multitude of tasks including weight training, practice, film review, and travel for competition. This makes the student's life complex. According to Watt and Moore (2003), student athletes are constantly balancing their academic and athletic roles to satisfy their obligations to parents, guardians, coaches, and teammates. Further, Jolly (2008) indicated that as student athletes progress through their educational experience, they also experience higher structured time demands in regard to their sport participation, this being very true for college freshman.

As a result, states have adopted the Common Core in an attempt to level the educational field, to prepare students for college rigor, and to prepare them for their chosen career field (CCSSI, 2010). Meanwhile, the National Collegiate Athletic Association (NCAA) has also increased its initial eligibility rules to ensure incoming student athletes are ready for college-level academic rigor and athletic participation (Hosick & Sproull, 2012). However, the state and NCAA academic requirements are different. Even with the Common Core standards at the high school level, the interscholastic-level athletic eligibility and graduation requirements still may not match the initial eligibility requirements that the NCAA deems necessary for success in college. Even so, student athletes who wish to continue their athletic career into the college arena are required to meet rigorous incoming NCAA requirements. Student athletes wishing to participate at the Division I level are held to requirements in English, mathematics, and social science; must earn a minimum GPA; and must earn a combined SAT or ACT sum score that matches the core course GPA and test-score sliding scale (NCAA, 2015a).

The states and the NCAA have acknowledged this lack of preparedness among entering college students and as a result have increased their requirements (Dickman & Lammel, 2000). However, they have not changed their academic requirements at the same rate. As a result, this leaves student athletes potentially unprepared for the academic rigors and challenges of college.

Venezia and Jaeger (2013) noted that "many studies over the past ten years have documented the disconnect between what high school teachers teach and what postsecondary instructors expect with regard to students' preparation for first-year credit-bearing

courses in college" (p. 119). At the time of this study, 43 states in the United States have adopted the Common Core as their curriculum standard (CCSSI, 2015; Stewart, 2012; Ujifusa, 2014). Yet, even with the Common Core standards placed at the high school level, the interscholastic-level athletic eligibility and graduation requirements still may not match the initial eligibility requirements deemed necessary by the NCAA for success in college. Even so, student athletes who wish to continue their athletic careers into the college arena are required to meet rigorous incoming NCAA requirements. Furthermore, Allison, Whitted, and Sawyer (2007) demonstrated that administrators, parents, coaches, and booster clubs have had a stronger influence on interscholastic policy makers than what research or even the motivation to prepare students better for college or career reflects.

The purpose of this study was to provide a thorough analysis of the 50 state high school activity/athletic associations' interscholastic academic requirements compared to the NCAA Division I (DI) initial eligibility core course requirements. I also sought to determine whether an academic course completion gap exists between the interscholastic level and the NCAA Division I level for student athletes and, if so, the parameters of that gap.

Literature Review

There is a growing concern regarding preparedness at the interscholastic level for students who are preparing to transition to college. High school success is vital in that it develops the gateway to college admissions. Currently, concerns surrounding graduation rates and overall academic success are growing. As a result, there have been strides regarding minimum academic requirements for students at all academic levels. Crom, Warren, Clark, Marolla, and Gerber (2008) noted that the best way to approach these concerns is by examining individual subgroups rather than the general population as a whole. One subgroup that falls under high scrutiny concerning academic success is student athletes (Crom et al., 2008). For student athletes, proper high school preparedness is a large part in determining not only their college preparedness but also their initial eligibility for athletic participation (Allison et al., 2007, p. 9). Student athletes spend their time practicing a balancing act between their academic and athletic commitments (Watt & Moore, 2003).

Therefore, this population faces increased concerns when it comes to academic success.

The majority of interscholastic institutions have set an academic standard for student athletes to participate in athletics and/or other cocurricular activities, but there is not a one-to-one match in academic standards from the interscholastic level to the intercollegiate level (Allison et al., 2007, p. 10). Interscholastic and intercollegiate governing bodies have increased their requirements to reflect the need to increase success rates among students (Allison et al., 2007, pp. 9–10). However, these requirements have increased at a higher rate at the intercollegiate level than at the interscholastic level. Allison et al. (2007) noted that interscholastic administrators, coaches, and parents fear that increased academic requirements will lead to large-scale declines in athletic participation. Meanwhile, individuals at the intercollegiate level are noting declining graduation rates and increasing dropout rates; these declining rates have prompted intense academic reform for the past several years (Crom et al., 2008). As a result, the academic requirements are disproportionate from high school to college and therefore are a cause for concern regarding the academic preparation given to student athletes transitioning from one level to the next.

State Associations

All 50 United States and the District of Columbia reside under the oversight of the National Federation of State High School Associations (NFHS). The NFHS (2014) develops and determines sport rules and guidelines for those within its membership. As stated in the NFHS (2014) eligibility rules, each state has its own athletic/activities governing body that determines if more rigorous academic requirements should be enacted for athletic participation. These requirements may include a minimum GPA, enrollment, and credit hours completed. As a result, every state does not have the same academic requirements for its student athletes. Thus, the states lack consistency in academic requirements. For example, the Vermont Principals' Association (2014) leaves additional academic requirements up to the individual schools within its state and the Georgia High School Association (2014) requires its athletes to "pass classes [with at least a 70%] that carry at least 2.5 Units counting toward graduation the semester immediately preceding participation"

(§ 1.50). In turn, the differences in requirements may result in different academic expectations for student athletes from one state to the next. Sequentially, this may cause student athletes to develop differences in self-awareness in regard to their academic performance.

Common Core

A defining component of academic curricula is the Common Core. The Common Core was developed in 2009 by the Council of Chief State School Officers (CCSSO) and the National Governors Association (NGA; CCSSI, 2013). The CCSSO and NGA have illustrated that the Common Core standards were developed solely from research that revealed the essential skills students need to master for their future careers and to succeed in meeting rigorous college requirements (CCSSI, 2015). Academic standards before 2009 determined what content should be taught in the classroom; however, few resources were available to assist teachers in determining the cognitive skill benchmarks students should reach by the end of each year. This situation created not only a knowledge imbalance for students within a single school but also a dramatic difference between students in different states and countries (CCSSI, 2015). Therefore, the Common Core was developed to level the educational field, to prepare high school students for their future careers, and to prepare them for the academic rigors of college (CCSSI, 2015).

The Common Core standards were developed not only to level the educational field in the United States, but also to make it comparable at the international level (CCSSI, 2015). Therefore, regardless of what country, state, or school a student attends, the student should achieve the same academic expectations as his or her peers around the world. To make sure these expectations are being maintained, the CCSSO and NGA ensure that the standards reflect worldwide changes by further building on the foundation of the standards and drawing upon opinions from other entities. These opinions are solicited from "state departments of education, scholars, assessment developers, professional organizations, educators from kindergarten to college, and parents, students, and other members of the public" (CCSSI, 2010, p. 3). The CCSSI (2010) posits that the standards are a "living work" (p. 3). Therefore, as new research emerges, the standards will continue to reflect these changes (CCSSI, 2010).

According to the standards for learning languages within the CCSSI (2013), the Common Core requirements focus on the "English Language Arts [ELA] and Mathematics that need to be effectively taught and learned for students to be ready to succeed academically in credit-bearing, college-entry courses and in workforce training programs" (p. 1). It should be noted that the ELA area extends into the subjects of history/social studies, sciences, foreign language, and technical subjects, as well (CCSSI, 2013). The ELA standards have been developed around the coverage of reading, writing, speaking and listening, and languages, with the determined goal that from these strands students will learn effective communication skills (American Council on the Teaching of Foreign Languages [ACTFL], 2012). The Common Core provides not only the standards for the material that should be covered, but also the cognitive proficiency level that students should demonstrate as they progress through each school year. These proficiency levels are defined as Novice, Intermediate, and Advanced (ACTFL, 2012). Therefore, as students acquire more schooling, they should be progressing through the proficiency levels (ACTFL, 2012).

In addition, the Common Core and K–12 standards define the benchmarks for student achievement for each academic year and readiness levels upon completing high school. However, the standards do not define how a teacher has to administer the material to students. The "standards do not mandate such things as a particular writing process or the full range of metacognitive strategies . . . needed to monitor and direct . . . thinking and learning" (CCSSI, 2010, p. 4). Thus, teachers can use their expertise to decide what materials and knowledge to use to meet the standards (CCSSI, 2010).

Moreover, the Common Core standards state that upon graduation students are college and career ready if they can demonstrate they are independent; can build strong content knowledge; can respond to the varying demands of audience, task, purpose, and discipline; can comprehend as well as critique; can value evidence; can use technology and digital media strategically; and can understand other perspectives of culture (CCSSI, 2010, p. 7). However, the Common Core standards also note that these are the minimum knowledge and skills with which students should be graduating. The standards do not assert that additional knowledge and lessons can-

not be taught (CCSSI, 2010). The standards also do not define how to implement and use intervention methods for students who are low performing or have special needs. The school and its administration are responsible for determining the methods and resources necessary for these special circumstances (CCSSI, 2010). However, it is expected that upon high school graduation students will have acquired the knowledge and skills to be literate and versatile persons of the 21st century (ACTFL, 2012).

Standard High School Graduation Requirements

The Education Commission of the States provides information on the graduation requirements set by each state in the United States (Zinth, 2013). Each state shows minimum graduation requirements in English, mathematics, social studies, science, PE/health, art, foreign language, and electives (Zinth, 2013). The states with the Common Core standards tend to have higher graduation requirements in English, mathematics, social studies, science, and foreign language (Zinth, 2013). Common Core–driven states generally require students to complete more classes in these areas to graduate (Zinth, 2013).

However, there are no minimum core course requirements for each subject area (Zinth, 2013). Therefore, each state is different in its graduation requirements. For example, Alabama requires students to complete four Carnegie units in mathematics, Connecticut requires three Carnegie units, and California only requires two Carnegie units (Zinth, 2013). These types of differences exist across all states in each subject area (Zinth, 2013). Thus, there is a notable difference in academic requirements and expectations across the states. Although there is curriculum rigor expectations, such as those expressed by Common Core standards, there are no blanket course requirements or graduation requirements for all of the states in the United States. Therefore, students are engaged in curricula with differing time parameters for each subject and thus are still receiving different academic experiences from one state to the next.

Method

In this study, I qualitatively analyzed relevant documents and used frequencies to generate themes that revealed whether there is a gap between interscholastic academic requirements and the NCAA

Division I (DI) initial eligibility requirements. I identified differences by comparing requirements that resulted from various educational reforms that occurred between 1995 and 2014. The purpose of this study was to indicate if academic requirements changed at the interscholastic and intercollegiate levels equally over the past two decades, the lack thereof potentially resulting in an academic preparation gap for student athletes progressing from high school to college. Therefore, I analyzed the current state academic requirements for student athletes in comparison to initial eligibility requirements set by the NCAA for the DI level, to show whether there is an academic preparation gap.

I used document analysis because it provided the most meaningful interpretations of the interscholastic and intercollegiate academic requirements because of the way the requirements are communicated. Each of the 50 United States displays its academic requirements in its state constitution and bylaws publically through the state website. The NCAA displays its initial eligibility requirements in its annual NCAA DI manual, which is publically available online. These documents are updated each year and are therefore considered accurate information. I used a frequency table to accurately indicate the themes identifying academic differences between the 50 United States and the NCAA. I used the numeric findings to identify trends and as a basis for assertions about student athlete preparation in regard to their transition from high school to NCAA DI athletics.

Data Collection

I obtained documents from each of the 50 United States from the official state athletic associations online. Each state provides constitutions and bylaws regarding the minimum academic requirements its student athletes must fulfill to participate in athletics. The documents are kept online and open to the public so that any direct affiliates can access these rules at any time. Therefore, I assumed that these documents were up to date.

Like the states, the NCAA provides its academic requirements online and they are open to the public. Thus, those interested in intercollegiate athletics can easily access the requirements for initial eligibility. For this study, I accessed the NCAA DI 2014–2015 initial eligibility academic requirements. In addition, the NCAA keeps its handbooks online and open to the public. This way, anyone can

view historical rules and regulations. For this study, I also used the 1995–1996 NCAA handbook to compare initial academic eligibility requirements.

Last, I used Sawyer's (1995) research study to develop a comparison of state academic standards from 1995 to 2014. The data from Sawyer's (1995) study and the current state academic requirements provided an accurate look at the longitudinal changes that have occurred over the past two decades. Thus, I could make assertions on whether interscholastic academic requirements have increased, decreased, or stayed the same over time.

Results

I analyzed each state for a course completion requirement of at least four courses in the previous year for athletic participation. The completion of four courses per year is important because NCAA DI requires student athletes to complete 16 core courses over the course of eight semesters for initial eligibility (NCAA, 2015b). The NCAA's 16 core course requirements include 4 years of English; 3 years of mathematics (Algebra 1 or higher); 2 years of natural or physical science; 2 years of social science; 1 additional year of English, mathematics, or science; and 4 additional years of previously listed classes, foreign language, or comparative religion/philosophy (NCAA, 2014). The state courses did not have to be core courses defined by the NCAA. However, based on the Common Core standards, it can be assumed that the majority of the courses passed would fall into one of the core courses defined by the NCAA. Although I did not analyze the type of course, the number of hours completed in a previous year is still an essential stepping stone to NCAA DI initial eligibility.

2014 state course completion findings. A review of the state's requirements from each attendant website showed that 31 of the 50 states (62%) had a course completion requirement for the preceding year for student athletes to be eligible for play. However, only 26 (52%) required student athletes to complete a minimum of four courses in the preceding year to be eligible for play. The remaining five states (10%) allowed a minimum of three courses a year. The spectrum of completed course requirements for an academic year ranged from three to six courses. For the 31 states with a course completion requirement, the average was 4.45 courses.

Of the 26 states that required students to complete four courses in the preceding year, 10 (38%) specified that courses must count toward graduation. In addition, only three of the 26 states (12%) stated that the courses had to be new courses for which the student did not previously receive credit.

1995 state course completion findings. According to Sawyer (1995), 27 out of 50 states (54%) required student athletes to complete a minimum of four courses in the preceding year to be eligible for play. Within the 27 states, the course completion requirements for an academic year ranged from four to five courses.

1995/2014 comparison. For state interscholastic academic eligibility requirements, 27 states (54%) required students to pass at least four courses each year in 1995 compared to 26 states (52%) in 2014. This is a decrease of one state (2%) requiring student athletes to pass four courses in the preceding year. Between 1995 and 2014, seven states elected to relax their academic rigor. Only six states increased their academic rigor by 2014. The remaining 37 states (74%) experienced little to no increase in their academic requirement regarding course completion requirements.

In comparison, from 1995 to 2014 the NCAA increased its initial eligibility standards for core courses. In 1995, the NCAA required student athletes to complete 11 specific core courses to be eligible. However, by 2014 the NCAA required student athletes to complete 16 specific core courses for eligibility. Therefore, even though the NCAA increased its academic core course requirement by five courses in two decades, the interscholastic level experienced a decrease in the number of states requiring students to pass at least four courses in the preceding year.

Based on this data, it can be concluded that there is a marked negative difference in the 2014 NCAA initial eligibility standards regarding core courses compared to the declining course completion requirement within a portion of the 50 United States.

Discussion and Implications

NCAA DI presides over 350 institutions of higher education and a large body of students (over 170,000 athletes) that hold their student athletes to high academic expectations upon entering college and throughout their time within athletics (NCAA, 2015b). It is stated in numerous ways at the intercollegiate level that students at

the interscholastic level are in general coming into college not fully prepared for the academic rigors (Jolly, 2008). Therefore, understanding the current interscholastic academic standards provides a key indicator of academic preparation at that level. Preparing these students is imperative to their success at the intercollegiate level and within DI parameters.

By 2014 just over half of the states required students to pass four courses in the preceding year to be eligible for athletics. This is important for college athletic participation because NCAA DI requires student athletes to complete 16 core courses over eight semesters for initial eligibility (NCAA, 2015c). Therefore, the completion of four courses a year would place a student in a position to meet the NCAA DI 16-core-course requirement for initial eligibility. Furthermore, only 10 of the 26 states with a course completion requirement stated that the courses had to count toward graduation. Given these course completion details, interscholastic policy makers should create policies that ensure student athletes are making progress toward graduation. Not only is graduation a requirement for students to enter the intercollegiate level, but it is also a pathway to postsecondary education or extended employment opportunities. Because of the limited number of states with a four-course completion requirement, it is possible that some states are keeping their academic requirements at a minimum to keep athletic participation rates high and to encourage students to complete high school, but these short-term fixes are impeding the progress of students for the long term. Therefore, policy makers should also be cognitive of the courses required for high school graduation and should ensure that student athletes are making progress toward graduation goals.

The Common Core standards state that upon graduation students are college and career ready if they can demonstrate they are independent; can build strong content knowledge; can respond to the varying demands of audience, task, purpose, and discipline; can comprehend as well as critique; can value evidence; can use technology and digital media strategically; and can understand other perspectives of culture (CCSSI, 2010, p. 7). The academic rigor within the Common Core assists students in becoming college and career ready. However, the Common Core does not specify a minimum number of courses for students to complete each year. Therefore, although one of the Common Core goals is to prepare students

for college, course time exposure and course completion rates are not regulated. As a result, this potentially leaves a preparation gap between the interscholastic and intercollegiate levels. Based on these findings, I suggest that interscholastic policy makers be aware of the 16 specific core course requirements for NCAA initial eligibility and be aware of how their specific state graduation requirements compare to the 2014 NCAA initial eligibility standards. Given that the Common Core addresses interscholastic-level course content and the attendant cognitive skills, there is a level of confidence that sufficient rigor is embedded in the core courses required by the NCAA initial eligibility standards to prepare students adequately for academic success at the intercollegiate level. Moreover, interscholastic policy makers should overtly consider the articulation of the curriculum within the realities of high schools to determine if their policy is ensuring students stay on track for graduation.

The NCAA has determined the 16 core courses for initial eligibility based on the skills that should be developed at the interscholastic level. The NCAA has determined that students who complete these 16 core courses will have developed the academic skills to handle the academic rigor of college programs at DI schools (Hosick & Sproull, 2012). The problem-solving and critical thinking skills upon which the NCAA bases its initial eligibility standards are the same skills mirrored within the Common Core rigor at the interscholastic level. However, as noted, the Common Core does not dictate the number of courses a student must complete. Therefore, the NCAA has determined the 16 interscholastic core courses that students need to develop the necessary cognitive skills to enter DI and succeed in college, whereas the interscholastic level does not have a blanket core course requirement for eligibility. As a result, this may create a college preparation difference in students who progress out of the interscholastic level.

In regard to this educational disconnect, John Dewey's argument against dualism reiterates the need to align the academic requirements between the interscholastic and intercollegiate levels. According to Kliebard (1995), "One had to get rid of the prejudicial notion that there is some gap in kind between the child's experience and the various forms of subject-matters that make up the course of study" (p. 72). That is, the child and curriculum are not

separate entities, but a single entity. As a child gains power within the curriculum by successfully solving challenging, relevant problems through critical thinking, then the child becomes engaged with the curriculum. Therefore, by making interscholastic requirements more rigorous, policy makers are developing a connection between students' academic and athletic experiences. By understanding this developmental connection at the interscholastic level, high schools can adjust students' educational experience to further build upon their academic goals for students. Without the development of this connection, students may simply be fulfilling the minimum requirements for high school graduation to move into the intercollegiate level to continue their athletic careers. Therefore, given Dewey's concerns regarding dualisms, and given the tie between athletics and academics, the educational experience for students could be further advanced.

Recommendations

The presence of a minimum four-course completion requirement in the previous year would help align the interscholastic and intercollegiate academic requirements. Based on the data in this study, the presence of a four-course completion requirement is declining for state academic eligibility. The data show that currently only 26 states (52%) require students to pass four courses in the previous year. This leaves a big difference in the state and NCAA initial eligibility requirements. Therefore, if states were to set a four-course completion standard for eligibility, their requirements would better align with NCAA requirements. However, states that specifically indicate that all four courses need to be new credit toward graduation put their athletes in the best stance to meet the core course requirements for NCAA initial eligibility standards.

Conclusion

It is stated in numerous ways at the intercollegiate level that students are in general coming into college not fully prepared for the academic rigors (Jolly, 2008). Therefore, it is imperative that policy makers understand the tie between athletics and academics, and how these conjoining units work together in the development of students. The purpose of placing additional academic requirements at the interscholastic level is not only to make the interscholastic- and

intercollegiate-level academic requirements comparable, but also to increase the academic performance of students. Therefore, interscholastic policy makers are responsible for further educating themselves on the additional benefits of increased academic requirements and for motivating academic change within the athletic arena.

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PEDAGOGY

Do Physical Educators Promote Students' Creativity? An Observational Analysis Study

Elisavet P. Konstantinidou and Vasiliki Z. Zisi

Abstract

The ordinary nature of creativity and the global acceptance of its significance have made it a key characteristic of citizens in knowledge-based societies. Although research interest in recording teachers' perceptions on creativity and its promotion have been noticeably increasing, a remarkable gap has been observed in teachers' behaviors and actions to promote creativity. The purpose of this study was to delineate teaching behaviors and actions when educators try to promote students' creativity in class. The Creativity Fostering Teacher Behaviors (CFTB) checklist is based on the well-established theory of Cropley (1997), who suggested what behaviors teachers should demonstrate to foster their students' creativity. The CFTB checklist has been developed through a content validity method and has been tested for interrater reliability, which has been found to be very satisfactory. We observed 30 physical educators (PEds) twice during PE lessons in which they aimed to foster students' creative expression. PEds expressed only a minority of their creativity-fostering behaviors and actions, especially those associated with encouraging the responsibility of learning, such as the enhancement of autonomy, independence, and social integration, during learning processes. On the contrary, the enhancement of flexibility, a top indicator of creative achievements denoting a person's divergent thinking, and the positive management of failure and frus-

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tration, which is thought to eliminate students' emotional barriers and inhibitors of creativity, were almost absent during observations. The same happened for indicators such as opportunities for deviation, lack of rush and criticism delay on students' ideas and suggestions, and all of the other indicators on the CFTB checklist. We discuss a misalignment of theory into practice concerning teachers' creativity-fostering behaviors and actions. Possible factors related to this inadequacy such as lack of academic education, training and continuous professional development in related issues, and the curriculum itself may limit PEds from teaching for creativity.

The promotion of creativity arrived with a great ballyhoo at the beginning of the new millennium. Creativity is a substantial personal quality in knowledge-based economies, along with other fundamental characteristics such as competitive development, modernization, innovation, and smart entrepreneurship (Commission of the European Communities, 2007; Organisation for Economic Co-Operation and Development [OECD], 1996). Creativity is a characteristic that should be developed in everyone. National and worldwide organizations and authorities have thus included the promotion of creativity in their guidelines, recommendations, policy decisions, and actions ("Conclusions," 2008; "Education and Training 2010," n.d.; "Education and Training 2020," n.d.; "2008 joint," 2008; National Advisory Committee on Creative and Cultural Education, 1999; UK Department of Education, 2013). Educational systems and authorities have begun to nurture students' creative potential in school settings, through their curricular documents or educational actions (Australian Curriculum, Assessment, and Reporting Authority, 2014; Pedagogical Institute [PI], 2003; Qualifications and Curriculum Authority, 2004).

Physical education (PE) is a creativity-fostering school subject, and Heilmann and Korte (2010) confirmed this. Their study revealed a high occurrence of the term *creativity* and synonyms in primary and secondary school curricula (eight school subject groups) in Europe (EU27). The Greek PE curricula was among the top five in the occurrence of the term *creativity* and synonyms. Additionally, PE was among the top three school subjects in EU27, together with ICT and Arts, in which the term *creativity* and synonyms were the most prominent. PE should be expected among the top subjects in

schools for promoting students' creative potential given the long history of research in creative movement. Research in creative movement, which focuses on the kinesthetic responses of children, has been established and studied for many years under the term *motor creativity* (Torrance, 1981; Wyrick, 1968) or *divergent movement ability* (Cleland, 1994; Cleland & Gallahue, 1993).

With the variety of options for movement exploration and ways to respond to motor problems, or movement exploration and ways to respond to motor problems, students have many opportunities to develop their creative thinking skills. Konstantinidou, Michalopoulou, Aggelousis, and Kourtesis (2011) found in their qualitative study that PE encompasses a wide range of activities that allow creative outcomes to emerge, such as team games, practicing sports skills, activities for developing fundamental movement abilities, motor improvisation, and dancing. This wide range of activities seems to contribute to the development of higher cognitive skills (analogical reasoning, convergent and divergent thinking, problem-finding and -solving ability, causative thinking, etc.). The results of another contemporary international study (OECD, 2009) strongly support the contribution of PE to students' personality characteristics related to their creative self. The results of that study, which was based on teachers' opinions, perceptions, beliefs, and activities, emphasize the importance of PE that offers learning experiences that are provided less often in other subjects such as mathematics, science, and foreign language. It was found that during PE classes, students are offered many student-oriented practices and also structuring ones. Given the more practical nature of the subject, there seems to be more opportunities for student co-determination of lesson content, ability grouping, and individualized instruction. These chances allow students to take responsibilities, self-organize, and develop a broad spectrum of skills that will be helpful for their future professional lives.

Promoting creativity in school is a complex matter (Runco, 2007; Ward, 2007). As Cropley (1999) indicated, creativity is influenced by many factors such as students' psychological constellations, personal properties, motivation, cognitive and social factors, and a variety of aspects related to the teaching–learning environment and interactions. Cropley (1997) also stated that teachers who want to foster their students' creativity should demonstrate behaviors and actions

that enhance and encourage students' (a) independent and (b) social integrated way of learning, (c) motivation for mastering basic and factual knowledge, (d) way and formulation of ideas and thoughts by delaying judgments, (e) flexible thinking, (f) self-evaluation, (g) personal suggestions and ideas by taking them seriously, (h) opportunities for divergence, and (i) positive management of disappointments (frustration from mistakes, errors, and failure on tasks), to encourage them to try new and unusual things. Since then, some researchers have recorded teachers' self-perceptions on promoting these teaching behaviors (Barahona, 2004; Konstantinidou, Zisi, & Michalopoulou, 2014; Soh, 2000) and emphasized the gap in this research field concerning teachers' effectiveness in promoting creativity in schools. Apart from these efforts, many other researchers have explored creativity-related issues from the spectrum of teachers' implicit theories, perceptions, beliefs, views, stances, and conceptions (Bolden, Harries, & Newton, 2010; Craft, Cremin, Burnard, & Chappell, 2007; Diakidoy & Kanari, 1999; Fleith, 2000; Fryer & Collings, 1991; Kokotsaki, 2011; Konstantinidou, Gregoriadis, & Grammatikopoulos, 2011) to shed light on promoting creativity in school classes and in specific school subjects.

Despite the efforts for promoting creativity through educational policies, initiatives, actions, and curricula, and despite the growing interest of scholars to record how teachers perceive creativity and its promotion in a variety of subjects (Ferrari, Cachia, & Punie, 2009; Kampylis, Berki, & Saariluoma, 2009; Konstantinidou, Michalopoulou, Aggelousis, & Kourtesis, 2013; Tan, 2001), there is a research gap regarding the actual promotion of creatvity in classes, underlining the need for observing teaching for creativity. The results of such observational studies could shed light on the practices of physical educators (PEds) in their classes to promote their students' creative potential. After a thorough literature review, however, we found no instruments for systematic observation of teachers' behaviors and actions when they are trying to promote students' creativity in their classes. The primary concern was thus developing such an observational tool, which was recently achieved in a preliminary study (Konstantinidou & Tsoumpouktsoglou, 2014). This observational checklist provides opportunities for new methodological designs and approaches in researching the teachers' role in fostering students' creativity.

The purpose of this study was to observe PEds' behaviors and actions in their classes to promote students' expression of creativity. The results of this study may contribute to educational policies and practices of teacher training, which would thus strengthen teachers' knowledge base, abilities, and efficiency in promoting a creative environment for children.

Method

Participants

Thirty PEds (13 men, 17 women) from 27 schools of the prefecture of Thessaloniki (20 from east and seven from west suburban districts) participated voluntarily in this study. This sample was derived from all of the primary schools in the region of Central Macedonia, North Greece ($N = 868$). More specifically, of 220 PEds from 205 primary schools (24% of the total population, $M_{age} = 43.77 \pm 3.89$ years, $M_{teaching\ \ experience} = 13.43 \pm 5.12$ years) who participated in a parallel study (Konstantinidou, 2012; Konstantinidou, Gregoriadis, Grammatikopoulos, & Michalopoulou, 2013), 74 declared they wished to participate in the forthcoming observational research, which formed the sample pool for this study. We selected teachers who could apply the teaching protocol, as described in the Research Procedure section, without deviations from their formal teaching schedule to participate in this study. The participants had a mean age of 43.25 ± 4.18 years and a teaching experience in primary PE of 13.53 ± 5.16 years.

Instrument

To observe PEds' behaviors and actions while they promoted creativity in PE, we used the Creativity Fostering Teacher Behaviors (CFTB) checklist. The CFTB is based on the CFT Index (Soh, 2000), a 45-item instrument with nine subscales (five items per scale), which is based on Cropley's (1997) well-established theory for teachers' behaviors to foster students' creativity. To develop the checklist, Konstantinidou and Tsoumpouktsoglou (2014) used a well-known content validity method (Lawshe, 1975). Via e-mail, the researchers asked 11 experts in the fields of PE and education to choose two of the five items (behaviors or actions) of each subscale of the CFT Index that they considered the most representative for each dimension.

Also, the researchers asked them to consider which of the behaviors and actions could be better recorded through naturalistic observation during lessons. After receiving experts responses, the researchers developed an 18-item checklist. Items were presented in Greek, because in the study of Konstantinidou, Zisi, and Michalopoulou (2014) the CFT Index was translated and culturally adapted in Greek (Gr-CFTIndex). Additionally, the researchers tested the CFTB for interrater agreement in eight of 60 observations and found it to be adequate to perfect with Cohen's kappa coefficient (K = 0.75 to 1.00; Konstantinidou and Tsoumpouktsoglou, 2014). The reduction of the items (behaviors) from 45 to 18 for the development of the CFTB checklist was inevitable, because in naturalistic observation it is impossible to observe such a large number of teachers' behaviors and actions, as compared with video analysis observation, for which the recordings can be watched multiple times.

Research Procedure

We implemented a nonparticipant (the observer is not directly involved in the situation being observed) naturalistic systematic observation using the CFTB checklist. We chose naturalistic observation because it was the only observational method allowed at schools at the time of the study (filming and sound recording of lessons is prohibited in Greece by law). Naturalistic observation records the facts as they occur, and as Gay and Airasian (2009) stated, the observer purposely controls or manipulates nothing and works very hard to not affect the observed situation in any way. In our study, the observer marked a tick in a CFTB item when the corresponding behavior or action was presented by the PEd. For example, the observer marked a tick in the item "Follows up on students' suggestions with questions to make them think further" each time the PEd gave relevant feedback on students' motor responses or verbally expressed ideas using key questions concerning the elements of movements the students used (e.g., qualitative characteristics such as time, space, dynamics, relationships with others or body parts or with equipment). At the end of each observed lesson, we calculated a total score of ticks for each item.

We observed each of the 30 participants in two lessons (a total of 60 observations). We chose specific lessons from the Greek PE Cross Thematic Curriculum Framework for Compulsory Education

(CTCF; PI, 2003) for Grades 1 and 2. After thorough discussions with experts in the field of PE, we decided to observe the same lessons for all PEds, to apply a subjective measure. As most relevant and suitable for the subject matter of the observation, we chose the 26th and 27th lesson plans from the psychomotor content guiding principle of the curriculum entitled Movement Expression and Motor Creativity. One week before each observation, we contacted the PEds to arrange the following issues regarding the teaching protocol:

- the exact day and time of the observation,
- the grade (G2) and the class (the same for both observations),
- the specific lessons (26th and 27th) with the specific order,
- maintaining the specific order of the activities of each lesson, and
- implementing the same content of the activities.

With all of the above, we made every effort to maintain the same conditions during each observation. Before the beginning of the research procedure, we visited every class for a lesson to get familiar with the children.

Results

We calculated the means and standard deviations for each of the 18 observed behaviors or actions of PEds for the total of 60 lessons. Table 1 shows the frequency of manifestation of each observable behavior per lesson and the mean and standard deviation of each behavior for the 60 lessons. Some teaching behaviors and actions manifested in most of the 60 lessons such as Items 9, 11, and 18, whereas other behaviors (Items 6, 12, 13, 14, 16, and 17) occurred in few lessons. On the contrary, Items 2 and 7 manifested at least one time in 51 and 45 lessons, respectively, and had the highest manifestation frequency for the 60 lessons. High in observation, but less frequent than the last behaviors, Items 3, 4, 5, 10, and 15 manifested in 43, 44, 37, 35, and 34 lessons, respectively. Despite their appearance frequencies in many lessons, their means ranged from 1.10 ± 1.19 to 2.65 ± 2.01, which indicates that behaviors manifested from one to almost three times per lesson.

Table 1
Frequencies, Means, and Standard Deviations for Each Creativity-Fostering Teacher Behavior

Item	The teacher:	At least one time	Never	Once	Twice	Three times	Four times	Five times	Six times	Seven times	Eight times	Nine times	*M*	*SD*
1	Teaches students the basics and leaves them to find out more for themselves.	30	30	16	8	3	2	1					0.90	1.19
2	Leaves open-ended questions for students to find the answers for themselves.	51	9	11	10	12	7	6	3	1		1	2.65	2.01
3	Provides opportunities to students to share ideas and views.	44	17	20	11	8	2	2	1				1.47	1.43
4	Provides opportunities for teamwork.	44	16	12	16	12	3			1			1.63	1.43
5	Emphasizes the learning of the basic knowledge/skills.	37	23	16	11	4	2	2	2				1.33	1.56
6	Makes sure the students learn the basics well, which is more important than covering the syllabus.	9	51	5	1	2	1						0.28	0.80
7	Follows up on students' questions with questions to make them think further.	45	15	13	12	7	6	2	4	1			2.05	1.89
8	Encourages students to do things differently although doing this takes up more time.	31	29	15	7	3	4	2					1.07	1.40
9	Encourages students to think in different directions even if some of their ideas may not work.	2	58	2									0.03	0.18
10	Likes students to take time to think in different ways.	35	25	15	12	5	3						1.10	1.19

Table 1 (cont.)

Item	The teacher:	At least one time	Never	Once	Twice	Three times	Four times	Five times	Six times	Seven times	Eight times	Nine times	*M*	*SD*
11	Provides opportunities for students to share their strengths and weaknesses.	4	56	4									0.07	0.25
12	Gives opportunities to students to judge for themselves whether they are right or wrong.	14	46	8	3	2		1					0.42	0.94
13	Follows up on students' suggestions so they know he/she takes them seriously.	16	44	11	4	1							0.37	0.69
14	Listens to students' suggestions even if these are not practical or useful.	15	45	11	3		1						0.35	0.73
15	Appreciates students when they put what they have learned into different uses.	34	26	13	7	6	2	3	1	2			1.47	1.87
16	Doesn't mind if students try out their own ideas and deviate from what he/she has shown to them.	16	44	8	4	2	1	1					0.52	1.07
17	Encourages students to take frustration as part of the learning process.	8	52	8									0.13	0.34
18	Encourages students who experience failure to find other possible solutions.	2	58	2									0.03	0.18

To decode the deriving results for the facilitation of the following discussion, regarding the observable behaviors we used indicators based on obvious questions:

What behaviors . . .

- had the highest appearance frequency in all 60 courses (appeared at least one time)?
- had the highest frequency per lesson?
- had the lowest frequency per lesson (the most lessons with no appearance/none)?
- had the highest frequency mean per course?
- had the lowest frequency mean per course?

Table 2 evidences the most noticeable behaviors according to these indicators.

Discussion

The purpose of this study was to delineate what behaviors and actions teachers demonstrate during their efforts to promote creativity in children. We chose to observe PEds because PE is thought to be one of the most fruitful subjects to cultivate students' creative potential, especially in primary education (i.e., Heilmann & Korte, 2010; Konstantinidou, Michalopoulou, et al., 2011). Based on the findings, leaving open-ended questions for students to find the answers for themselves was the most frequent observable behavior of PEds and occurred in 51 of 60 lessons. The specific behavior is important because it reflects teachers' promotion of students' independent learning and when exhibited in class it underlines a teacher who emphasizes the exploration method and more specifically divergent thinking ability. Open-ended questions and activities are considered key elements in nurturing children's creativity and leave room for children's independent thinking and opportunities for divergence (Torrance, 1981). As Johnston (2007) declared, open-ended activities provide children with opportunities for self-differentiation, with children choosing their actions and responses based on their own experiences, knowledge, and skills. This reflects the ownership of their learning. Konstantinidou, Zisi, and Michalopoulou (2014) used the term *enhancement of students' responsibility for learning*, which embraces many teachers' behaviors plus their choice to use open-ended questions and problems. In this way, teachers strengthen

Table 2

Prevalent Behaviors per Lesson or in Total of 60 Lessons According to Specific Indicators

Item	The teacher:	A Highest appearance (at least once)	B Highest frequency per lesson	D Highest frequency mean per lesson	C Lowest frequency per lesson	E Lowest frequency mean per lesson
2	Leaves open-ended questions for students to find the answers for themselves.	✓	✓	✓		
3	Provides opportunities to students to exchange ideas and views.	✓		✓		
4	Provides opportunities for teamwork.	✓	✓	✓		
7	Follows up on students' questions with questions to make them think further.	✓	✓	✓		
9	Encourages students to think in different directions even if some of their ideas may not work.				✓	✓
11	Provides opportunities for students to share their strengths and weaknesses.				✓	✓
17	Encourages students to take frustration as part of the learning process.				✓	✓
18	Encourages students who experience failure to find other solutions.				✓	✓

their students' independent thinking, freedom of self-expression, and self-confidence. Despite its importance, this behavior did not occur often. The mean frequency of appearance was close to three times per lesson ($M = 2.65 \pm 2.01$). This behavior had the highest frequency appearance in a lesson (nine times), but only in one case. Additionally, it was not present in nine lessons (the fewest lessons in which a behavior did not appear). Kampylis and Berki (2014), based on research findings, agreed that open-ended questions help students develop creative thinking and learning because they require students to find, analyze, combine, criticize, and evaluate knowledge, experiences, and information instead of simply recalling facts. Kampylis and Berki concluded, however, that on average only 20% of the questions asked in classrooms are open-ended, which is in line with the findings of this study.

The second most frequently observed teacher behavior was following up on students' suggestions with questions to make them think further. This behavior occurred in 45 of 60 lessons. The mean frequency of appearance was close to two times per lesson ($M = 2.05 \pm 1.89$) and the highest frequency appearance was seven times in a lesson. Similar to the aforementioned behavior, when teachers use this technique, they do not want to give ready solutions and answers to their students. On the contrary, teachers want to enhance students' independent thoughts and searching for solutions and answers based on their own problem identification and finding. These thinking skills put students at the core of the learning process and they thus become more responsible for the learning outcome. This behavior of teachers was also embraced in a previous study under the umbrella of enhancing students' responsibility for learning (Konstantinidou, Zisi, & Michalopoulou, 2014). They explained that this teacher behavior implies students' enforcement of thinking about their own thinking (metacognition skill), which results in the development of their autonomy as learners. The tendency toward autonomy and independence is a personality trait that is one of the most consistent and connected with the expression of creativity (Feist, 1999).

Enhancing communication and collaboration were also frequently observed PEd behaviors. The third most frequently observed behaviors were providing students opportunities to exchange ideas and views and providing students opportunities for teamwork. The

former behavior was observed in 44 of 60 lessons, with a mean frequency of appearance tending to once per lesson (M = 1.47) and a maximum appearance of six times per lesson. The latter behavior was also observed in 44 of 60 lessons, with a mean frequency of appearance approaching two times per lesson (M = 1.63) and a maximum appearance of seven times per lesson. The aforementioned behaviors denote teachers' tendency to promote a socially integrated and collaborative approach for learning. These behaviors are oriented toward the socialization of students by enhancing their participation in this process. Teachers who give students opportunities for exchanging ideas and opinions focus on the social integration of their students. Through teaching for students' social integration, teachers facilitate the ego strength, which tones up the students' self-confidence and allows them to follow intrinsic interests (Runco, 2007). On the other hand, teachers who provide students opportunities for group activities focus on encouraging cooperation. Cooperation and communication are crucial social competences required within a 21st century knowledge-based society ("Recommendation," 2006).

The top most unseen behavior was encouraging students to think in different directions even if some of their ideas did not work. The specific behavior did not show up in 58 of 60 lessons and had an almost nonexistent mean frequency of appearance (M = .13, SD = .18). The other item (10) for flexibility promotion manifested at least one time in 35 lessons and had a mean frequency of appearance of 1.10 (SD = 1.19). This fact advocates that flexibility (the subscale on which the behaviors were anchored) was not cultivated in the observed lessons. Flexibility is one of the most popular qualities connected with creativity. According to Thurston and Runco (1999), it is an important aspect of the creative cognitive process, as in the divergent thinking model (fluency, flexibility, originality), that allows the individual to see all parts of a problem and supports open-mindedness.

The behaviors of the subscale of Positive Management of Failure (Items 17 and 18) also manifested only a few times. The former was observed only in eight lessons (M = .13, SD = .34) and the latter only in two lessons (M = .03, SD = .18). Davis (1999) included anxiety and fear inside the emotional barriers of creativity and identified low frustration tolerance as a recurrent negative trait of creativity. Either

as temporary states, caused perhaps by problems with peers, parents, pressures, and worries at school, or as permanent states such as the feelings of fear of failure, being different, criticism, and rejection, these emotional barriers should vanish in a school environment that fosters creativity. A surprising fact revealed in previous research in the field of PE creativity (Konstantinidou, Zisi, Katsarou, & Michalopoulou, 2014) is that PEds have identified several emotional barriers of students that may cause their frustration and disappointment, thus their fear to express themselves creatively. Keeping in mind that PEds sense their students' frustration and fears, we were disappointed that we did not observe this kind of behavior (removing frustrations from children once they appear) in this study. Lack of this behavior perhaps left some frustrated children away from creative challenges and potentials.

Providing opportunities to students to share their strengths and weaknesses was also one of the most unobservable behaviors. The particular behavior did not show up in 56 of 60 lessons and had a tremendously low mean frequency of appearance (M = .07, SD = .25). This behavior (Item 11), together with Item 12, reflected the subscale of Evaluation. As Cropley (1999) mentioned, strict evaluation is often seen as anti-creative, though total failure to ask students whether their ideas are realistic or effective is not the best way to promote creativity. Students, by sharing strengths and weaknesses of their results, become involved by self-monitoring their personal work, a process of deep awareness of assets or flaws of their own way of thinking. Teachers should expose students to such procedures if they want to nurture creative minds. Besides the previous most and least observable teacher behaviors, all of the others (a) mostly appeared once or twice in one to 16 lessons, (b) never appeared in 23 to 51 lessons, and (c) had a mean frequency of appearance ranging from .20 ± .80 to 1.33 ± 1.56.

At this point, it is worth reminding that we chose the observed lessons from the Greek PE CTCF (PI, 2003) and purposely selected them because they were designed to enhance movement expression and motor creativity. Regarding teachers' behaviors and actions for promoting students' creative potential, a lot can be said, but, as this study reveals, not so much can be done. The "translation" of theory into practice concerning creativity promotion in PE from the aspect

of teachers' behaviors seems to be problematic. Craft (2005) explained how policy scaffolding and research findings support teaching for creativity in curriculum and pedagogy, but raised many issues about the constraints and tensions in the translation of policy into practice and the formation of policy from practice. Disconnected curriculum and curriculum organization may disaffect teaching for creativity. In this study, this could greatly explain the teachers' inadequate behaviors for fostering creativity. From browsing the PE CTCF (PI, 2003), we found that it could create confusion about creativity conception and approach. Konstantinidou, Zisi, Katsarou, & Michalopoulou (2014) raised various contradictions, conflicts, and questions concerning the approach of creativity and its promotion through this curriculum. In the PE CTCF, creativity can be seen as a subject or be promoted through some subjects in PE; as a goal or an objective of some activities; as part of the axis of the cognitive domain; as an ability, a skill, or a combination of them; or as a process, an outcome, a situation, or a capability of students themselves. The term *creativity* and other synonyms are mainly used in some lesson plans of the psychomotor content guiding principle (development of basic movements and fundamental movement skills) and in others such as music and education, mainly for Grades 1 and 2. In the curriculum for higher elementary grades, the particular terms are used less often. On the contrary, *creativity* and other related terms are excluded in sports and games and in training of sports skills, and in the unit of traditional dances, creativity occupies a tiny place as the objective of specific activities. This disarray inside PE curriculum does not happen only in Greece. Lavin (2008) pointed out that the only aspects in the English PE curriculum that relate to creativity are in dance, games, and gymnastics. Art or art-related subjects have been traditionally connected with creativity (Aljughaiman & Mowrer-Reynolds, 2005; Diakidoy & Kanari, 1999; Kampylis et al., 2009), and Konstantinidou, Zisi, and Michalopoulou (2014) mentioned that it is possible that the orientation of the PE CTCF toward dance, music, movement activities, fundamental motor abilities, drama, and dance improvisation cultivates and subconsciously nurtures teachers' misconception, which may stand as a barrier and inhibitor of them promoting students' creativity.

Teachers' inadequate fostering of students' creativity might also be explained through PEds' personality and qualifications.

Konstantinidou, Zisi, and Michalopoulou (2014) identified this factor as a blocker. Together with inappropriate teaching methods and styles for fostering creativity, (a) lack of knowledge and experience coming from academic and vocational training and (b) negative personality traits, which reflected their lack of interest and motivation, along with different fears, were heightened barriers for teachers. Education and limited knowledge about the subject are considered to be the most common barriers to creativity in education (Kampylis et al., 2009) and other work sectors (Groth & Peters, 1999), as well. As opposed to these barriers, knowledge and training on creativity-related issues support teachers to understand and promote creativity (de Alencar, 1991).

The findings of this study have proved—with only a small exception—that teachers express behaviors associated with the *encouragement of the responsibility of learning*, meaning the enhancement of autonomy, independence, and social integration during learning processes for the sake of promoting creativity. On the other hand, teachers' behaviors that enhance flexibility, a top indicator of creative achievements, which implies a person uses divergent thinking skills, and positive management of failure and frustration, which may remove emotional barriers and inhibitors of creativity, were almost absent during observations. Also, behaviors such as opportunities for deviation, lack of rush and criticism, delay on students' ideas and suggestions, motivation to master factual or basic knowledge and skills, and taking students' ideas and suggestions seriously were largely absent.

Conclusion

PEds' inadequate fostering of students' creativity might be due to insufficient academic base knowledge and training and insufficient continuous professional development in contemporary issues such as creativity. Of course, education and training alone cannot make the difference in teachers' effectiveness on creativity promotion. Creativity should be more valued in education circles. Educational institutions, interrlated bodies, and teachers themselves need to take multifaceted action through policies and initiatives to further teaching behaviors that foster creativity; otherwise, creativity will remain hidden to our young world citizens.

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PEDAGOGY

Early Validation Evidence of a Canadian Practitioner-Based Assessment of Physical Literacy in Physical Education: Passport for Life

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Abstract

Physical and Health Education Canada has developed and implemented a formative, criterion-referenced, and practitioner-based national (Canadian) online educational assessment and support resource called Passport for Life (PFL). It was developed to support the awareness and advancement of physical literacy among PE students and teachers. PFL consists of three assessments for each of the four components (active participation, fitness, movement, and living skills). The aim of this study was to uncover initial validation evidence for its current uses using four of the five broad guidelines (content, response processes, internal structure, relations with other variables) for establishing satisfactory score validity as established by the Standards for Educational and Psychological Testing. We conducted a pilot test with 860 students in Grades 4 and 5 in 2013–2014. We analyzed these data, along with data collected across 2 years for Grades 3 to 6 (n = 1,036 in 2013–2014 and 1,254 in 2014–2015) and Grades 7 to 9 (n = 1,793 in 2013–2014 and 1,151 in 2014–2015). A portion (15 to 25%) of these students completed some of the assessments a second time in each of these years. Validation evidence included the development of PFL by a number of domain experts, the nature and format of the components and scales relative to existing literature and evidence, the administra-

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tive procedures to guide teachers to implement the assessments, the alignment of items with each component construct and scale, teacher feedback, and positive and significant relations and temporal (predictive) consistency over the 2 years within and across scales and components. These results provide general support for the PFL and its intended use and highlight several cautions and recommendations.

According to Physical and Health Education Canada (PHE Canada, n.d.), physical literacy is moving "with competence and confidence in a wide variety of physical activities in multiple environments that benefit the healthy development of the whole person" (para. 2). This definition has been supported in key policy documents such as the Ontario Health and Physical Education Curriculum (Ontario Ministry of Education, 2015), Canadian Sport Policy 2.0 (Sport Canada, 2012), and SHAPE America's (2014) National Standards for K–12 Physical Education. In recent years, PHE Canada has led the development of a national educational support resource called Passport for Life (PFL) to support the awareness, assessment, and advancement of physical literacy among physical education (PE) students and teachers (see http://passportforlife.ca/). PHE Canada designed PFL to serve as a feasible (i.e., clear, achievable, economical, efficient, safe, timely) formative, criterion-referenced, practitioner-based assessment of key aspects of physical literacy. The primary aim of this study was to uncover initial validation evidence for current uses of PFL, that is, to determine "the degree to which evidence and theory support the interpretation of test scores" for its proposed use (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education [AERA, APA, & NCME], 2014, p. 11). We also endeavored to explore the feasibility of PFL, namely, its usability for practitioners to administer in a timely manner at the risk of the results having somewhat diminished psychometric properties (Gosling, Rentfrow, & Swann, 2003).

In the position paper that helped to frame PHE Canada's definition of physical literacy, Mandigo, Francis, Lodewyk, and Lopez (2009) outlined the holistic nature of physical literacy within educational settings as a lifelong personal journey. Building on the work of Whitehead (2001), they integrated key concepts beyond the physical characteristics of physical literacy by ensuring that the concept was

consistent with current thinking around literacy (United Nations Educational, Scientific, and Cultural Organization, 2003). Concepts such as movement capacities that reflect the embodied self, physically challenging environments that motivate individuals across a number of activities, and incorporating key cognitive and social components by being able to "read" the environment were embedded into PHE Canada's definition based upon Whitehead's seminal work. The holistic nature of the physical literacy definition is consistent with the goals of lifelong psychomotor, health-related physical activity participation and fitness, and affective and cognitive learning outcomes that are embedded throughout PE curricula across Canada (Kilborn, Lorusso, & Francis, 2016) and elsewhere (Lacy & Hastad, 2003; SHAPE America, 2014). Because of the complexity and multidimensionality of such a holistic view of physical literacy, PFL was designed to reflect students' physical literacy closely (rather than exactly equate with or mirror it), so there is no composite score on it beyond scores for fitness skills, movement skills, active participation, and living skills. These four representative components of physical literacy in PFL were identified during a consultative process lasting several years and align with PHE Canada's definition of physical literacy. After completing a short demographic survey, participants proceed through the movement and fitness skill components. These include six physical movement assessments (three for each component), which the teacher administers during PE class. During these assessments, the teacher closely follows a detailed rubric to rate each student on a 4-point scale. Participants also complete the living skills (consisting of feeling, thinking, and relating scales) and active participation (comprising the scales called movement environment, and interest and intentions) components consisting of self-report items that students can complete online during or outside of school hours.

The consultation and development process of PFL also resulted in the emergence of several keystone guiding principles. These included the need for PFL to be inclusive, adaptable, individualized, relevant (e.g., aligned to curriculum), process (vs. product) oriented, safe, comprehensive, ongoing, affirming, valid, efficient and clear, and useful for formative (learning) rather than summative (grades) and the need for the promotion of lifelong development of physical

literacy. To support the use of PFL as a learning tool, PHE Canada collects and stores student data from PFL in an online platform, enabling teachers to input, manage, and download the data for each of their students and classes. This also allows teachers to use the data to provide individualized attention to help students and classes set goals and work toward continued improvement. The online PFL program also includes guides with information, resources, and ideas to help students, teachers, and parents interpret and use the assessment results for ongoing improvements in physical literacy. Students receive a paper Passport that includes a summary of their results on each completed assessment, along with suggestions for how to improve each component, to bring home to share with their parents/guardians.

The broad guidelines for establishing satisfactory score validity set by the Standards for Educational and Psychological Testing (Standards; AERA, APA, & NCME, 2014) served as the theoretical framework for this study. These standards assert that, rather than validating an instrument, validation involves providing ongoing evidence about the property of test scores and interpretations stemming from particular contextual uses of that instrument. Consequentially, an instrument can be neither invalid nor valid but rather relatively valid depending on its application. Further, instead of articulating validity as a variety of "types" (e.g., content, criterion, and construct), the Standards also promote a unified conceptualization of validity evidence stemming mainly from the content, response processes, internal structure, relations with other variables, and consequences of testing. Because we wish to describe the development and initial results and procedures of PFL, we will report on the first three with some early evidence for the fourth (relations with other variables). More specifically, for the first (score validity evidence that is based on content) we will analyze the format, wording, and administrative guidelines for the items and scales of the instrument. For the second (internal structure evidence), we will attest to how well the instrument-specific items align (interrelate) with its construct(s) and score interpretations. For the third (response process evidence), we will investigate the extent that scores reflect the construct, partic-

ularly through the way that participants engage with (i.e., interpret and answer) the items. Finally, we will explore relations with other variables to ascertain how closely the test scores and their interrelations associate with similar or associated variables concurrently or predictively as measured by other instruments.

Method

Participants

Pilot test. PFL was first developed for and pilot tested in the 2012–2013 academic year to 860 students in Grades 4 (n = 325; 37.8%) and 5 (n = 532; 61.6%) (and n = 3 not reporting) with relative equal balance between males (n = 355) and females (n = 351) from 18 schools in eight provinces (British Columbia, Alberta, Saskatchewan, Manitoba, Quebec, New Brunswick, Nova Scotia, and Newfoundland) of Canada.

Grades 3 to 6. Table 1 provides the sample sizes for each administration of PFL by component. In the fall season of the 2013–2014 academic year, 1,036 students in Grades 3 to 6 participated in PFL with approximately 40% of students completing all of the PFL components and approximately 22% (n = 123–240) completing some of the components a second time in the spring season. Grade level was reported by 90% of the students ($n_{\text{Grade 3}}$ = 109, $n_{\text{Grade 4}}$ = 221, $n_{\text{Grade 5}}$ = 218, $n_{\text{Grade 6}}$ = 244) and only 15% (n = 176) reported their gender (81 females, 95 males), so we did not perform any comparisons by gender for this report. Nine provinces were represented with the most from Ontario (n = 420) and the least from Prince Edward Island (n = 6).

The sample size of the 2014–2015 administration of PFL to Grades 3 to 6 was 1,254, which was reduced to 1,199 following a screening of outliers. Those providing voluntary demographic data revealed relatively equal proportions of participants by grade level ($n_{\text{Grade 3}}$ = 457, $n_{\text{Grade 4}}$ = 270, $n_{\text{Grade 5}}$ = 254, $n_{\text{Grade 6}}$ = 218) and gender (145 females, 182 males) with most from the province of Ontario (n = 573).

Table 1
Sample Sizes for the Passport for Life Components by Developmental Level, Year, and Time

			Assessment component and time (T)							
			Movement skills		Fitness skills		Living skills		Active participation	
Grade	Year	Provinces	T1	T2	T1	T2	T1	T2	T1	T2
3–6	2013–14	BC, AB, SK, MN, ON, QB, NB, PE, NL	647	200	791	240	892	123	1141	154
	2014–15	BC, AB, SK, MN, ON, QB, PE, NL, NT	629	151	817	187	980	220	1082	262
7–9	2013–14	BC, AB, MN, ON, NB, NL	1241	580	1349	559	1348	536	1549	547
	2014–15	BC, AB, SK, MN, ON, QB, NB	589	138	757	194	878	195	996	209

Note. BC = British Columbia; AB = Alberta ; SK = Saskatchewan; MN = Manitoba; ON = Ontario; QB = Quebec ; NB = New Brunswick; NS = Nova Scotia; PE = Prince Edward Island; NL = Newfoundland; NT = Northwest Territories.

Grades 7 to 9. In 2013–2014, 1,793 students in Grades 7 to 9 completed PFL. The sample was from six provinces with the majority from Ontario (n = 1,276) and the least from New Brunswick (n = 20) and Newfoundland (n = 22). Only a portion of the total sample reported their gender (301 females, 262 males) and grade level ($n_{\text{Grade 7}}$ = 53, $n_{\text{Grade 8}}$ = 72, $n_{\text{Grade 9}}$ = 431).

In 2014–2015, 1,151 students in Grades 7 to 9 completed PFL. Screening for outliers resulted in the deletion of 69 cases, so the final participant sample for analysis was 1,082. Participants were from seven of the Canadian provinces and territories with most (n = 616) from Ontario. Only a portion of the total sample (n = 598; 53%) reported their gender (316 females, 282 males). The number of students by grade was 443 in Grade 7, 273 in Grade 8, and 366 in Grade 9.

Data Collection

When participating teachers registered their class for the PFL program, they were provided with the option to input the data from the various measures directly into an online database. This database is housed on a secure (password and username protected) online repository hosted by PHE Canada that generates a Passport specific to each student and class. The data provide formative feedback to the teacher, students, and parents on current levels of each student's physical literacy. The data contain no individual identifiers. Each participant receives a unique code, which ensures anonymity. As such, it falls under the category of secondary data analysis, which is defined as ". . . the use in research of information or human biological material collected for a purpose other than the current research purpose" (Canadian Institutes of Health, Natural Science, and Engineering Research Council of Canada & Social Sciences and Humanities Research Council of Canada, 2014, p. 209). The university research ethics board and PHE Canada approved the use of these data for the purposes of the validation study outlined in this paper.

Measures

Feedback from practicing teachers. Following the completion of the initial PFL for each developmental level, most of the participating teachers ($n_{\text{Grade 4–5 pilot}}$ = 22, 100% participation; $n_{\text{Grade 7–9}}$ = 31, 68% participation) voluntarily completed an online exit survey devel-

oped by PHE Canada program management. The survey consisted of 55 items, for which participants responded on a 4-point Likert scale (1 = *strongly agree*, 4 = *strongly disagree*) and through written responses to provide feedback about the initial program. We downloaded and analyzed these electronic data to discern the nature of teacher and student experiences with the assessments. We analyzed and reported the 12 most relevant items to this study as the proportion (%) of respondents reporting favorable (either 1 or 2) responses. The Grade 4 to 5 teachers consisted of 11 males and 11 females, with 17 specialists (degrees in and certification in teaching PE) and five generalists (degrees and certification in another domain). The Grade 7 to 9 teachers consisted of 13 males and 18 females, with 26 specialists and five generalists.

Student profile. Prior to beginning PFL component assessments, students provided (once each year) general demographic data (e.g., gender, grade level) and responses to these two items: "How many times a week do you have PE class?" (0–5) and "How long are you physically active each day?" (1 = *less than 20 minutes*; 2 = *20 to 40 minutes*; 3 = *41 to 60 minutes*; 4 = *more than 60 minutes*). Because the second item closely reflects active participation, we reported it within that component in this study. For the administration of these and the other self-report items to Grade 3 students and to individuals with disabilities, teachers were encouraged to read and explain (as necessary) the items to students carefully. Because this demographic survey was optional, with only a portion of the students completing it, we provide their descriptive results only.

Living skills. The living skills component consisted of three short self-report surveys—to which participants responded on a 4-point scale (1 = *never*, 2 = *sometimes*, 3 = *most of the time*, 4 = *all of the time*)—that assessed feelings (seven items), thinking (seven items), and interacting skills (seven items) with positive links to healthy, active living. Table 2 provides a list of items by scale. The items representing the feeling scale assessed living skills related to students' motivation (participation, importance, enjoyment, self-efficacy, anxiety, body image, and autonomy) for physical activity.

Table 2
Living Skill Scale Items, Factor Loadings, and Variance Explained

	% of variance and factor loadings			
	Grades 3 to 6		Grades 7 to 9	
Scale, items, and item constructs	**2013–2014**	**2014–2015**	**2013–2014**	**2014–2015**
Feeling Scale, Items, and Item Constructs	45.63	53.85	54.53	52.29
1. I feel satisfied with the size and shape of my body. (Body Image) (4)	.53	.66	.74	.59
2. I feel that there are many physical activities that I can choose to do. (Autonomy) (8)	.74	.75	.56	.73
3. It is important to me to be physically active at least 60 minutes every day. (Importance Value) (9)	.69	.75	.76	.76
4. I feel relaxed (free of stress and fear) when performing physical activities. (Anxiety) (15)	.66	.71	.81	.68
5. I am sure that I can perform well in a wide variety of physical activities. (Self-Efficacy) (18)	.71	.78	.73	.80
6. I enjoy being moving and playing regularly. (Enjoyment Value) (21)	.71	.75	.80	.75

Table 2 (cont.)

Scale, items, and item constructs	% of variance and factor loadings			
	Grades 3 to 6		Grades 7 to 9	
	2013–2014	2014–2015	2013–2014	2014–2015
Thinking Scale, Items, and Item Constructs	42.07	48.08	47.21	45.30
1. I know and can use movement words (such as hop, spin, run, and leap) to explain how I move. (Conceptual Knowledge) (2)	.56	.64	.54	.76
2. Before I make a hard decision about something, I think carefully about all my choices. (Critical Thinking) (7)	.62	.61	.70	.57
3. I take time to think about my past mistakes in PE and try to learn from them so I can continue to improve in PE. (Critical Thinking) (11)	.70	.73	.73	.65
4. I can figure out how hard my body is exercising through simple ways like taking my own pulse or knowing how much I'm sweating. (Monitoring Knowledge) (12)	.70	.73	.69	.62
5. I am able to set goals for myself and meet them. (Goal Setting) (14)	.72	.75	.75	.73
6. I work hard to learn and enjoy physical activities even if I don't like them that much. (Effort Regulation) (16)	.63	.73	.76	.71
7. I understand how moving, playing regularly, and eating good food can make me healthier. (Understand) (17)	.60	.66	.62	.65

Table 2 (cont.)

Scale, items, and item constructs	% of variance and factor loadings			
	Grades 3 to 6		Grades 7 to 9	
	2013–2014	2014–2015	2013–2014	2014–2015
Interacting Scale, Items, and Item Constructs	46.17	46.48	47.84	45.85
1. When in a group, I am able to provide the time, effort, and support necessary to solve difficult problems. (Problem-Solving) (3)	.67	.67	.67	.74
2. When I'm safe but get really upset about something, I think it over or talk to someone about it rather than yell at or hit someone. (Self-Control) (5)	.55	.61	.66	.66
3. I am able to play with any other student in my class even if they have different beliefs than mine. (Respect) (6)	.64	.64	.66	.61
4. I can get along well with others in order to create a physical activity that is fun to play. (Cooperation) (10)	.70	.75	.62	.68
5. I care for other people by sharing with, playing fair with, including, and encouraging them. (Care/Empathy) (13)	.74	.74	.75	.66
6. I can use the right words to let someone know their actions are hurtful to me or others. (Assertiveness) (19)	.75	.63	.72	.68
7. I know where to find the information I need to help solve problems even if it means asking others for help. (Resource Management – Help Seeking) (20)	.70	.74	.75	.71

Note. Principal components exploratory factor analysis loading onto one factor for assessment Time 1. Items listed are for Grades 3 to 6.

Because one of these items ("I do at least 60 minutes of physical activity a day in which I am 'huffing and puffing' and feeling warmer") assessed participation in moderate to vigorous physical activity (MVPA), we moved it to the active participation component for this study. The items categorized under the thinking scale assessed students' relevant understanding, conceptual knowledge, monitoring knowledge, critical thinking, goal-setting, and effort-regulation behaviors for physical activity. Items in the relating scale reflected students' problem-solving, self-control, help-seeking, empathy, respect, assertiveness, and cooperation skills in physical activity settings.

Active participation. The active participation component consisted of 22 self-report items among three scales (diversity, interests, and intentions). The first 15 survey items investigated participation and interest in five movement domains, namely, team sport activities (e.g., hockey, soccer, volleyball, flag football), individual sport activities (e.g., golf, swimming, track and field, karate, cycling), dance activities (e.g., freestyle, hip-hop, ballet, jazz), gymnastics activities (e.g., trampoline, tumbling, rhythmic gymnastics), and fitness activities (e.g., jogging, yoga, body weight exercises, circuits, training). These three questions were asked for each domain: (1) "How often do you do activities at school (e.g., PE class, sports teams, clubs, recess, etc.)?" (2) "How often do you do activities at home or in the community (e.g., with friends, with family, sports teams, clubs, etc.)?" (3) "How interested are you in doing more activities?" The diversity scale consisted of the first two questions for each of these five movement areas (10 items) along with six items assessing students' level of participation in physical activities on/in land, snow/ice, water, air, and indoor and outdoor settings "at least once per week for more than four weeks in a row over the past year?" Response choices for this scale were 1 (*never*), 2 (*sometimes*), 3 (*most of the time*), or 4 (*all of the time*). The interests scale consisted of the third question (above) for each of the movement domains (totaling five items) and participants reported these on a 4-point scale: 1 (*not at all interested*), 2 (*a little interested*), 3 (*interested*), or 4 (*very interested*). Finally, we assessed intentions using the following item adapted from Prochaska and Velicer's (1997) stages of change model: "What statement best describes your intentions for physical activity?" Response choices for this item were on a 5-point escalating Likert scale.

Fitness skills. The fitness skills component consisted of three items. The Plank Challenge measured core muscle strength, the Lateral Bound assessed dynamic stability (balance), and the Four-Station Circuit provided evidence of aerobic (cardiorespiratory) endurance. For each item, teachers simultaneously assessed as many students as they deemed feasible. Teachers assigned each student a score using a 4-point scale (1 = *emerging*, 2 = *developing*, 3 = *acquired*, 4 = *accomplished*) based on detailed descriptions of each in a rubric provided to teachers.

Plank challenge. This item assesses the students' ability to use their core muscles (i.e., abdominals, lower back, hip) to maintain a static position. Students start in a "tabletop" position (i.e., elbows under the shoulders, knees under the hips) with their hands and elbows on the mat and their knees on the floor. The students' hands should form a triangular base but not be clasped together. Teachers prompt the students to start in a tabletop position and then to extend one leg and then the other leg to assume the elbow bridge position. Students should maintain this static position for as long as possible (up to 60 s), and they perform two trials with a 60-s break in between trials. Teachers monitor for flaws such as sagging in the lower back, any major movement to secure original position, raising the buttocks, major torso twists, bridging of the back, and/or dropping to the ground. A rubric for teachers describes that a score of 1 (*emerging*) should be assigned to students who use more than one rest interval or adjustment to maintain the proper position for the allotted time, a 2 (*developing*) to students who use one rest interval or adjustment, a 3 (*acquired*) to students who maintain the proper position for the allotted time of 60 s, and a 4 (*accomplished*) to students who do this for two consecutive trials.

Lateral bound. This item assesses the students' ability to consistently maintain a state of equilibrium in a static position after motion. Students attempt to balance on one leg, bound laterally across the required distance (sideways) landing on their opposite leg, and without pausing, bound back to their original leg and hold the position for at least 5 s so teachers can scan the group. Students are given one practice trial on each leg before testing, to allow them to determine their preferred leg. Students perform three trials and the teacher records the level that they achieve most consistently. Teachers use the scoring rubric to determine the level the student

achieves in each trial. The rubric informs teachers to watch for indications that students are unable to "stick" their landings, such as wobbling/wavering of the body, the other foot touching the ground, or the landing foot moving for students to gain a balanced position. For example, to earn a score of 4 (*accomplished*), students achieve a soft, balanced landing with correct triple flexion technique (landing leg is flexed at ankle, knees, hips; elbows close to body; head is up) without major adjustments occurring such as upper body wobbles, wavers, or twists; landing foot adjusting by swiveling or hopping; moving continuously to gain balance; or having the opposite foot touch the ground. On the opposite extreme, teachers assign a score of 1 (*emerging*) if participants are unable to bound across the required distance, fall down, adjust their body position more than once (full hop, major lower and upper body movement, both feet touch ground, other foot touches ground), or demonstrate continuous movement to achieve a balanced landing.

Four-station circuit. This item assesses students' ability to exercise at a vigorous intensity continuously for 9 min without walking, pausing, slowing down, or stopping. Each circuit is set up in an area the size of a badminton court. Students perform four stations (agility ladder, ball jumps, figure eights, and scissors) for 30 s each continuously (without a break) for as long as possible up to 9 min. For the agility ladder, students move in a hopscotch pattern (two-foot hop in first square, two feet straddling the ladder, two-foot hop into the second square, two feet straddling the ladder, etc.) up and then back through the ladder. For ball jumps, students start in a squat position to pick up the ball and jump, raising the ball over their heads (similar to a burpee jump). When the students land, they squat down to touch the floor with the ball and then jump up again. Students are reminded to land softly on both feet with both knees flexed to absorb the force. At the figure eights station, students stand between the two cones facing one side/alley of the badminton court. Students will know if they are doing this correctly if their hips and shoulders are always facing the same side/alley of the badminton court. Students move their feet forward and then backwards to take them in a figure eight pattern around the cones. Finally, at the scissors station, students face forward with one foot on each side of the badminton end line and switch their feet back and forth continuously.

Students should be using a contra-lateral (opposite) arm/leg movement with their feet contacting the ground at the same time and their body weight over the line. Throughout the assessment, the teacher scans the group by circulating in between the station lines and records indicators of fatigue on a sheet of paper every 30 s. Indicators of fatigue include walking between station changes, slowing down at a station, pausing or stopping, or losing their technique or stumbling. For example, students receiving a score of 1 (*emerging*) tend to use more than three rest intervals to engage in MVPA for less than 7 min, whereas those earning a 4 (*accomplished*) do so continuously for 9 min with no rest intervals.

Movement skills. As in the fitness skills component, the movement skills component consisted of three items that the teacher rated on a 4-point scale (1 = *emerging*, 2 = *developing*, 3 = *acquired*, 4 = *accomplished*) based on detailed descriptions of each in a teacher rubric. The Run-Stop-Return item measured locomotion, the Throw and Catch With a Bounce item assessed object control, and the Advanced Kick provided evidence of object manipulation.

Run-stop-return. This item assesses the students' ability to run, stop, and change direction in a controlled manner. Two cones are placed 7 m apart on a flat, clean surface free of obstacles or debris and at least 3 m from any wall before the start line and after the end line. A straight horizontal line is placed (with tape) at the start and finish, and another vertical line connects the two horizontal lines and cones. From a standing position behind the start line, the students (upon a prompt) run as fast as they can to the other line/cone. The students then stop, turn around, and run back. When the students stop, they should do so with control (i.e., without taking a lot of extra steps). Two trials are given with time provided between trials to enable the students to change something about their running technique based on what they have learned. The teacher observes for signs of clumsiness (e.g., tripping, stumbling), signs of lack of balance (e.g., flailing arms, sliding, falling down), and overall smoothness of the movement. For example, a score of 1 (*emerging*) reflects a student who stumbles or trips on the start or while running, is unable to stop in a controlled manner (e.g., overruns the line or takes extra steps when changing directions), and does not demonstrate a mature running pattern. Conversely, those earning a 4 (*accomplished*) sprint to the

line with a mature running pattern throughout, stop with control, and change directions smoothly with arms and legs.

Throwing and catching with a bounce. This item assesses the students' ability to throw a ball with accurate direction, velocity, and trajectory and to catch the ball that they threw. This task also challenges students to use problem-solving and cognitive skills to monitor how they should throw a ball to have it bounce back so they can catch it. A taped line is placed on the floor parallel to the wall that is 1 m away from the wall and 2 m long. A horizontal line is also placed on the wall that is 1 m away from the floor and 2 m long. The students stand anywhere they want behind the line but should not cross the line when throwing or catching the ball. The students throw the ball so that it bounces on the ground between the line and the wall and then hits the wall above the line on the wall. The students then try to catch the ball without stepping over the line. The activity is not timed and each student should perform the activity three times with the first trial being for practice. Teachers observe for (a) whether the ball bounces on the floor between the line and the wall (designated floor bounce), (b) whether the ball bounces above the line on the wall (designated wall bounce), (c) whether the student catches the ball, and (d) whether the student crosses the line on the floor when throwing or catching. For example, teachers give a score of 1 (*emerging*) if a student steps over the line to bounce the ball on the floor, hits the wall with the thrown ball but not above the line, and does not catch the ball. For students to earn a top score of 4 (*accomplished*), the ball bounces on the floor between the line and the wall and also bounces above the line on the wall. In addition, the students catch the ball with a controlled catch and adjust their body according to the trajectory of the ball.

Kicks. This item assesses the students' object manipulation skills using a task that involves the upper and lower body and a ball. This assessment involves two subtasks (a stationary kick and a punt). A taped line is placed on the floor running parallel to the wall, 4 m away from the wall, and 2 m long. A different horizontal line is placed on the wall that is 1 m away from the floor and 2 m long. For the stationary kick, the ball is placed on a cone or something else safe to hold it in place, 4 m from the wall. The students should kick the stationary ball above the line on the wall. If the students kick the ball over the

line on the first trial, they move on to the second task (punt). If not, they try the stationary kick a second time and do not move on to the second task (punt). For the punt, the students stand behind the line 4 m from the wall, hold the ball in their hands, and step forward and release the ball to punt it without letting the ball hit the ground first. The students are aiming to punt the ball above the line on the wall. If the students do not manage to punt the ball over the line on the first trial, the assessment is complete. If the students are able to punt the ball over the line on the first trial, they get a second attempt.

Compared to a participant earning a 4 (*accomplished*) evident in solid technique and outcome in both tasks, those earning a 1 (*emerging*) do not successfully perform the first task (stationary kick) either procedurally (e.g., stumble or use improper steps or foot contact) or in outcome (i.e., ball does not go over the line on any trial). Those receiving a 2 (*developing*) perform the stationary kick successfully with minor flaws but are not successful technically or in outcome on the second task (punt). A score of 3 (*acquired*) reflects that students are successful technically and in the outcome of the stationary kick yet inconsistent in their technical and outcome performance on the punt task.

Modifications for Grades 7 to 9

The PFL component assessments described for Grades 3 to 6 were identical for Grades 7 to 9 except for minor differences in the living skills and fitness assessments and more extensive alterations in the movement skills. The duration of the Four-Station Circuit (Cardiovascular Endurance) assessment was 12 min (9 min for Grades 3 to 6) and the width between lines for the Lateral Bound (Dynamic Stability) was 85 cm (75 cm for Grades 3 to 6). In terms of living skills, 17 of the 20 items were either identical or had only a simple word(s) replaced to increase their complexity and relevance (e.g., "hard decision" to "difficult decision") for Grades 7 to 9. The meaning of the remaining five items was maintained despite altering the wording for complexity and relevance (e.g., "I feel that there are many physical activities that I can choose to do" vs. "I feel that I have many choices and options about the physical activities I can participate in").

Each of the movement skill assessments was significantly different for Grades 7 to 9 than for Grades 3 to 6. The Throw and Catch

(Object Control) assessment was the least modified by requiring the participant to stand and throw from a distance of 3.5 m from the wall (1 m for Grades 3 to 6) and to throw off the wall first (off the floor first for Grades 3 to 6) so that the ball bounces into an area 2 to 2.75 m from the wall before the participant attempts to catch it (while still standing behind the line 3.5 m from the wall). The teacher rubric was altered accordingly with *accomplished* as the "ball bounces in target area." The student catches the ball with one hand in a controlled manner without major body movement. The student does not take steps to catch the ball. The Kicks (Object Manipulation) assessment involving both a place and punt kick in Grades 3 to 6 was changed to the Punt and Catch for Grades 7 to 9 to assess students' object control and manipulation skills using a task that involves the upper (catch) and lower (punt) body and a ball. In the task, participants demonstrate the coordinated hand and foot motion to control kick (punt) a ball and predict motion of a ball to pursue, intercept, and catch it. The student drops a soccer ball held in both hands and punts (kicks it before it hits the ground) from behind a 3-m line and catches the ball after it bounces off the wall while never crossing the 3-m line. Finally, Run-Stop-Return (Locomotion) movement skill assessment was changed to Run-Side Shuffle-Back Pedal (Locomotion) to reflect more diverse means of locomotion in Grades 7 to 9.

The setup involves placing four cones—one in each corner of a rectangular (7 m × 3 m) flat surface and at least 3 m from any object (e.g., wall). From a position slightly left of the first cone and on a teacher prompt, the participants run as fast as they can up to and slightly past the pylon 7 m distant, then perform a rightward side shuffle to the adjacent pylon 3 m to the right, and then back pedal toward the final pylon 7 m to the rear and stop. Using the teacher rubric for guidance, the instructor observes for strong acceleration and deceleration, control, and fluid conversion between running, shuffling, and back pedaling.

Results

Content Evidence

Development. In this section, we add to and elaborate on the content validity evidence provided in the Method section. The

development of PFL involved an extensive consultation process. In January 2011, PHE Canada invited 15 to 20 PE experts from across Canada to meet to discuss the potential of a physical literacy assessment tool to be used in schools across Canada and, if recommended, what the guiding principles might be. Based on the outcomes of that meeting, in the summer of 2011 PHE Canada organized a gathering of six Canadian professor-researchers with expertise in PE curricula and pedagogy, physical literacy, and assessment, along with several school-based PE teacher-educator leaders, to develop PFL based on the guiding principles and its definition of physical literacy. This led to the formulation of the names and basic composition of the four components of PFL (Active Participation; Movement, Fitness, and Living Skills). Cognition was not a component, because it was viewed as being integrated and evident in the four components. Five members of this group then wrote and developed each of the component assessments and also met occasionally to review, plan, and provide guidance on PFL. This writing team represented a balance of expertise in each PFL component from across Canada. Each writer also had practical teaching-coaching experiences with children and adolescents in physical activity settings, four were certified specialists in physical and health education, and three were professor-researchers with terminal degrees in a relevant field (e.g., PE). Several iterations of each assessment were made based on feedback from the writers.

The results of the pilot test with Grade 4 and 5 students revealed that PFL data by measure were normally distributed (e.g., no ceiling or floor effect evident in skew or kurtosis) and had satisfactory concurrent validity (e.g., theoretically expected correlations among constructs and measures). For example, Pearson bivariate correlations among and between the three movement skill assessments and three fitness skill assessments were positive and statistically significant ($p < .001$) ranging from .28 to .45. Additionally, these skills correlated positively and significantly ($p < .01$) to students' self-reported participation levels in fitness activities at school ($r = .11–.20$). A comparison sample of 20 students from a fifth grade class was used to test the interrater and test–retest reliability and provide validity evidence of concurrent relations with PFL fitness and movement skill measures.

The intraclass correlation coefficient among three simultaneous raters using PFL rubrics for fitness and movement skills revealed good scoring agreement (.65 to .82). The analysis of test–retest reliability using the data from the three raters 1 week later revealed strong consistency (r = .72 to .89). Based on the feedback from this pilot test, modifications were made (most notably to the content of the living skills items) and expanded to include Grade 3 students with the Grades 4 to 6 assessment for full implementation in the fall of 2013–2014, along with a new PFL for Grades 7 to 9. Following the pilot of PFL with Grades 4 to 5 in 2012–2013 and revisions stemming from it, PFL was administered to Grades 3 to 6 and Grades 7 to 9 in 2013–2014 and 2014–2015.

Components. It was beyond the scope of this study to postulate much about the nature and content of physical literacy beyond highlighting that the four components of PFL and their assessments reflect the holistic nature of physical literacy as defined by PHE Canada (2015), SHAPE America (Roetert & MacDonald, 2015), and others (e.g., Whitehead, 2001). It is important, however, to demonstrate validity evidence that the content of PFL assessments adequately reflect the four component constructs (active participation and living, fitness, and movement skills) of PFL and that these represent the fundamental aims and outcomes of PE. Evidence for this is solid because of the extensive consultation process involving numerous experts in the relevant fields (e.g., assessment, PE, physical literacy) during the development of PFL, which was designed to align with vital psychomotor, health-related physical activity participation and fitness, affective, and cognitive learning outcomes embedded in PE curricula across Canada (Kilborn et al., 2016) and elsewhere (Lacy & Hastad, 2003; SHAPE America, 2014). Support for the four PFL components and their assessments is also evident in positive empirical associations between fundamental motor skills, physical activity and fitness, and advantageous psychosocial qualities, particularly during adolescence (e.g., Lubans, Morgan, Cliff, Barnett, & Okely, 2010; Stodden et al., 2008; Weiss, 2011).

By component, active participation in PFL was designed to reflect evidence that physically literate individuals intentionally attain regular and suitable physical activity at necessary levels of moderate to vigorous intensity. For example, current guidelines recommend

that children and adolescents engage in at least 60 min of MVPA every day (Canadian Society for Exercise Physiology, 2011; U.S. Department of Health and Human Services, 2009). To meet such guidelines, active participants tend to engage in and show interest in diverse physical activities (e.g., team, individual, dance, educational gymnastics, and fitness) in different settings (e.g., indoors and outdoors, at home, at school, and in the community) and environments (e.g., on ice, snow, and land, and in the water and air; Haga, 2008; Roetert & MacDonald, 2015).

The three assessments for living skills (feeling, thinking, and interacting) reflect noteworthy psychosocial characteristics with positive empirical links to being physically active. These include being motivated for and having advantageous feelings (e.g., body image, self-efficacy, interest, enjoyment); demonstrating relevant knowledge, understanding, critical thinking, and goal-setting behaviors; and having relational qualities such as problem-solving, personal and resource management, and communication skills (e.g., for reviews, see Chen, 2001; Weiss, 2011). Because of the quantity of psychosocial correlates of physical activity and the need for a concise survey to minimize time and increase rate of participation, we used one item to assess each of the psychosocial constructs (see Table 2). We modified these items slightly from previously used measures of the constructs to accommodate the Grade 3 to 6 and 7 to 9 developmental levels. For example, the stem of the item assessing self-efficacy ("I am sure that I can perform well in a wide variety of physical activities") has been used in many other diverse learning settings (Pintrich, Smith, Garcia, & McKeachie, 1991). Further, despite some compromises to psychometric properties, single-item scales are suitable for use in assessments such as living skills in PFL even for empirical research (Jordan & Turner, 2008).

The two teacher-administered PFL components (fitness and movement skills) represent two pillars of PE curricula (Newell, 2011) and were designed in PFL to provide affirming yet challenging physical assessments that might help youth to be aware of and interested in their levels of fitness and movement proficiency for optimal engagement in a lifetime of play, activity, and exercise. Gallahue, Ozmun, and Goodway (2012) reported that fundamental movement skills (categorized into stability, locomotor, and manipulative/object

control) provide the physical foundation or building blocks for developing more complex physical proficiencies and skills used in games, activities, sports, and leisure pursuits. The three PFL movement skill assessments of running (locomotor), kicking (object manipulation), and throwing and catching (object manipulation) reflect these core movement competencies that are commonly assessed in youth (e.g., Vandaele, Cools, de Decker, & Martelaer, 2011) and associated with healthy, active outcomes (Lubans et al., 2010; Stodden et al., 2008).

Research evidence suggests that children can develop these fundamental movement skills by age 6.5, yet a surprisingly low proportion of children do so (Gallahue et al., 2012). In regard to PFL fitness assessments (muscle strength, balance/dynamic stability, and cardiorespiratory endurance), they represent core aspects of fitness in PE (e.g., Kilborn et al., 2016; Lacy & Hastad, 2003; MacKenzie, 2003; SHAPE America, 2014). These fitness skills have also been linked to healthy, active outcomes and reflect more basic movement proficiencies. For example, each PFL fitness assessment reflects a person's cognitive understanding and postural control (i.e., balance and the ability to maintain a desired body orientation), which are prominent rate limiters of early motor development (Clark, 2007).

Response Process Evidence

We assessed whether the PFL component scores reflect the construct, particularly through the way teachers administer the assessments and participants engage with the items. The evidence consisted of teacher feedback on the exit survey following the Grade 4 to 5 pilot study and the first year of study with Grades 7 to 9. On the basis of their experience with PFL, the majority of teachers (95% for Grades 4 to 5; 83% for Grades 7 to 9) felt that students had a better understanding of physical literacy and that students' results would help improve their physical literacy (91% for Grades 4 to 5; 97% for Grades 7 to 9). Over 93% of the teachers of students in Grades 7 to 9 reported that students were easily able to understand and complete the assessments for each of the components, with none reporting strong disagreement. This sentiment was similar among Grade 4 to 5 teachers for the fitness and movement skills (> 85%), yet substantially lower yet satisfactory for living skills (71%) and for active participation (66%). The most common reason for these lower ratings

for the self-report assessments in Grades 4 to 5 was the difficulty many of the students had in comprehending the items. For example, one teacher responded, "Some students needed help with the wording of some statements as to what it meant."

Another important aspect of the response process evidence, particularly for criterion-referenced practitioner-based assessments for educational settings such as PFL, is its administrative usability for teachers, because "a careless approach to test administration can result in invalid scores" (Lacy & Hastad, 2003, p. 190). Results of the exit survey revealed that the teachers were generally positive about aspects of usability such as accessibility, relevance, and ease of using PFL teachers' guide with instructions (100% for Grades 4 to 5; 90% for Grades 7 to 9) and scoring rubrics (81% for Grades 4 to 5; 97% for Grades 7 to 9) for informing their teaching (100% for Grades 4 to 5; 97% for Grades 7 to 9). Teachers also reported that it was easy for them (100% for Grades 4 to 5; 84% for Grades 7 to 9) and their students (94% for Grades 4 to 5; 81% for Grades 7 to 9) to navigate the PFL website. The most prevalent administrative concern was the amount of class time spent completing PFL with 43% reporting that it took an unreasonable amount of time. According to most of the teachers, completing PFL required between 2.5 and 6 classes, which is reasonable, particularly given that psychometric qualities tend to be compromised on shorter tests (Gosling, Rentfrow, & Swann, 2003), particularly tests that assess constructs such as physical literacy, active participation, and fitness, living, and movement skills (Lacy & Hastad, 2003). Several teachers also expressed the need for more video aids to help with the movement and fitness skills and to assist them with particular challenges in administering some of the assessments (e.g., four-station cardiovascular circuit) simultaneously to small groups of students. In response, PHE Canada has added a variety of video tutorials and demonstrations.

Internal Structure Evidence

The descriptive statistics (i.e., means, standard deviations, skew, and kurtosis) revealed no abnormalities in any of the items or scales, particularly for large sample sizes (Tabachnick & Fidell, 2006), except for a consistently (by year and developmental level) negative skew and kurtosis (> 1.00) for the *intentions to be physically active* item

in active participation. Consequently, this item was not included in subsequent analyses. Another source of validation evidence is the degree that scores from the assessment items align (interrelate) with the construct being assessed relative to the intended interpretation of the assessments (Standards; AERA, APA, & NCME, 2014). We used principal component exploratory factor analyses loading onto a single factor and suppressing factor loadings < .30 to explore the factor structure for each living skill scale (feeling, thinking, and interacting) by year and level (Grades 3 to 6, Grades 7 to 9).

Because of the large sample sizes for the first assessment of each year relative to those lower than recommended for factor analysis (< 250) in the second assessment of each year (Tabachnick & Fidell, 2006), we used only the first assessment by year and level. Table 2 shows the results. Each item in each scale had strong factor loadings (.53–.81), which explained a satisfactory proportion of the variance (42.07–54.53%). Especially for scales with fewer than 10 items (Loewenthal, 1996), the internal consistency reliability coefficients (see Table 3) for each of the three scales by year and level were satisfactory (living skills, .75 to .86; active participation, .61 to .87; movement skills, .64 to .75; fitness skills, .62 to .77).

Noting the likelihood of maturation and other effects (e.g., motivational and seasonal) between repeated assessment times in the fall and spring seasons within each academic year (2013–2014, 2014–2015) and developmental level (Grades 3 to 6, Grades 7 to 9), we computed and reported test–retest reliability coefficients for the assessment scales to potentially signal the stability of measurement scores. We aligned the criterion with Loewenthal's (1996) standards for scales with fewer than 10 items, setting it at >.43 for an interitem test–retest correlation coefficient and > .60 for an internal consistency reliability coefficient.

Table 3
Descriptive Statistics and Internal Consistency for PFL Components by Assessment, Level, Year, and Time

Components, scales, and (# of items)	Grades 3–6								Grades 7–9							
	2013–2014				2014–2015				2013–2014				2014–2015			
	T1		T2		T1		T2		T1		T2		T1		T2	
	M (*SD*)	α	*M* (*SD*)	α	*M* (*SD*)	α	*M* (*SD*)	α	*M* (*SD*)	α	*M* (*SD*)	α	*M* (*SD*)	α	*M* (*SD*)	α
Movement Skills (3)	2.66 (.77)	.67	3.22 (.72)	.78	2.64 (.74)	.64	2.89 (.75)	.73	2.51 (.71)	.64	3.00 (.64)	.65	2.66 (.74)	.68	3.02 (.77)	.75
1. Locomotion	2.82 (.82)	_	3.23 (.73)	_	2.60 (.80)	_	2.95 (.75)	_	2.40 (.88)	_	2.80 (.76)	_	2.66 (.83)	_	3.09 (.78)	_
2. Object Control	2.70 (1.07)	_	3.33 (.86)	_	2.81 (.97)	_	3.03 (.97)	_	2.68 (.94)	_	3.20 (.77)	_	2.78 (.95)	_	3.10 (.97)	_
3. Object Manipulation	2.42 (1.05)	_	3.11 (.99)	_	2.54 (1.09)	_	2.71 (1.02)	_	2.44 (.99)	_	3.01 (.95)	_	2.58 (1.03)	_	2.90 (1.03)	_
Fitness Skills (3)	2.39 (.86)	.70	3.00 (.81)	.77	2.34 (.81)	.63	2.69 (.75)	.62	2.22 (.83)	.73	2.75 (.80)	.73	2.38 (.83)	.67	2.78 (.78)	.68
1. Balance	2.60 (.90)	_	3.27 (.75)	_	2.47 (.89)	_	2.96 (.76)	_	2.47 (.94)	_	2.97 (.82)	_	2.58 (.87)	_	3.13 (.78)	_
2. Muscle Endurance	2.44 (1.16)	_	2.91 (.07)	_	2.26 (1.01)	_	2.65 (1.09)	_	2.35 (1.17)	_	2.87 (1.00)	_	2.34 (1.10)	_	2.77 (1.00)	_
3. Cardiorespiratory Endurance	2.19 (1.12)	_	2.81 (1.09)	_	2.19 (1.05)	_	2.55 (1.04)	_	1.84 (1.03)	_	2.42 (1.09)	_	2.15 (1.09)	_	2.51 (1.09)	_
Living Skills (20)	3.14 (.49)	.90	3.16 (.54)	.93	3.04 (.54)	.93	3.15 (.52)	.92	3.01 (.52)	.92	3.09 (.53)	.93	3.08 (.52)	.92	3.08 (.52)	.92
1. Feeling (6)	3.26 (.55)	.75	3.29 (.62)	.86	3.03 (.62)	.83	3.17 (.61)	.83	3.01 (.65)	.83	3.09 (.64)	.84	3.12 (.62)	.81	3.12 (.63)	.83
2. Thinking (7)	3.08 (.54)	.77	3.08 (.59)	.84	3.12 (.56)	.82	3.22 (.55)	.83	2.97 (.56)	.81	3.08 (.56)	.84	3.05 (.56)	.80	3.05 (.54)	.80
3. Interacting (7)	3.10 (.56)	.86	3.16 (.59)	.84	2.98 (.58)	.83	3.06 (.57)	.81	3.04 (.54)	.84	3.11 (.55)	.85	3.07 (.55)	.83	3.08 (.55)	.81
Active Participation (22)	2.52 (.51)	.87	2.59 (.53)	.89	2.40 (.52)	.88	2.51 (.53)	.89	2.35 (.52)	.89	2.41 (.52)	.89	2.42 (.51)	.88	2.55 (.47)	.86
1. Diverse PA (16)	2.41 (.52)	.84	2.49 (.52)	.86	2.31 (.52)	.85	2.41 (.55)	.87	2.25 (.51)	.85	2.31 (.52)	.85	2.33 (.51)	.85	2.44 (.49)	.84
2. Interest (5)	2.59 (.69)	.68	2.57 (.72)	.73	2.42 (.68)	.69	2.54 (.64)	.61	2.41 (.68)	.70	2.51 (.68)	.71	2.44 (.65)	.66	2.58 (.62)	.61
MVPA/Day (1)	2.82 (.86)	_	3.02 (.88)	_	2.89 (.89)	_	3.05 (.83)	_	2.83 (.92)	_	2.94 (.89)	_	2.95 (.90)	_	3.03 (.88)	_

Note. All on a 4-point scale. MVPA = moderate to vigorous physical activity.

No items in the data for any year or level were below an interitem test–retest correlation coefficient of .24 or an internal consistency reliability coefficient of .40. In the Grade 7 to 9 samples, each of the items, scales, and components met the stability criterion with the exception of balance (.24 and .38) in 2013–2014 and several living skill items (five in 2013–2014, two in 2014–2015). In other words, 84–94% of PFL assessment items (41–46 of 49) met the criterion. This was somewhat lower in the two assessment times among the Grade 3 to 6 samples with 67% (33 of 39) meeting the criterion over the 2 years. Quantities of items by year that exceeded the criterion among the Grade 3 to 6 students were active participation (two in 2014–2015, 10 in 2013–2014), living skills (12 in 2014–2015, six in 2013–2014), fitness skills (balance in 2014–2015), and movement skills (object control in 2014–2015). Of course, item differences by assessment period might also be due to the different seasons when each assessment was administered (the fall and winter), hence their fluctuating responses to items that ask them to report, for example, their MVPA and frequency of participating in activities in water or on the ice/snow.

Pearson bivariate correlations between each scale within each component (Tables 4 and 5) were generally reflective of conceptual and theoretical expectations based on previous research. Scale correlations within each PFL component construct (e.g., feeling, thinking, and interacting scales within the living skills component) for the first assessment time in all four data sets had positive and significant associations ($p < .01$) and showed no evidence of problematic multicollinearity (> .80). Moreover, the correlations between each of the three scales within each component in all four data sets (2 years for two grade levels) were statistically significant ($p < .01$) with values ranging from .32 to .47 (movement skills), .63 to .79 (living skills), .31 to .52 (fitness skills), and .19 to .70 (active participation). These relations are further reflected in the significant ($p < .01$) between-component and MVPA correlations, as presented in Table 5. These results, along with the satisfactory internal consistency reliability coefficients for each scale, support the internal structure of each component and its scales.

Table 4
Component Scale Correlations by Year (2013–2014, 2014–2015) and Grade Level (3–6, 7–9)

Scale (component)	1 2013–14 (2014–15)	2 2013–14 (2014–15)	3 2013–14 (2014–15)	4 2013–14 (2014–15)	5 2013–14 (2014–15)	6 2013–14 (2014–15)	7 2013–14 (2014–15)	8 2013–14 (2014–15)	9 2013–14 (2014–15)	10 2013–14 (2014–15)	11 2013–14 (2014–15)	12 2013–14 (2014–15)
1. MS1 (Locomotion)	–	.41* (.33*)	.32* (.35*)	.41* (.38*)	.36* (.28*)	.48* (.32*)	.21* (.25*)	.17* (.19*)	.10* (.14*)	.18* (.22*)	.02 (.18*)	.17* (.21*)
2. MS2 (Throw-Catch)	.34* (.37*)	–	.47* (.45*)	.29* (.24*)	.30* (.26*)	.35* (.11)	.17* (.10)	.10* (.08)	.04 (.04)	.13* (.08)	.01 (-.01)	.14* (.09)
3. MS3 (Kick-Punt)	.31* (.43*)	.46* (.45*)	–	.28* (.22*)	.30* (.24*)	.36* (.07)	.16* (.05)	.10* (.00)	.03 (.00)	.15* (.11*)	-.07 (.02)	.21* (.02)
4. FS1 (Balance)	.35* (.41*)	.21* (.31*)	.16* (.20*)	–	.38* (.37*)	.41* (.34*)	.14* (.12*)	.13* (.13*)	.10* (.09)	.17* (.16*)	.12* (.15*)	.10* (.12*)
5. FS2 (Core Muscle Endurance)	.39* (.40*)	.23* (.29*)	.21* (.21*)	.42* (.46*)	–	.52* (.37*)	.14* (.14*)	.13* (.11*)	.03 (.13*)	.23* (.18*)	.07 (.12*)	.14* (.13*)
6. FS3 (Cardiorespiratory Endurance)	.47* (.41*)	.20* (.18*)	.14* (.18*)	.41* (.31*)	.51* (.44*)	–	.20* (.17*)	.12* (.15*)	.05 (.13*)	.18* (.19*)	.01 (.13*)	.14* (.16*)
7. LS1 (Feeling)	.30* (.27*)	.22* (.09)	.25* (.19*)	.11* (.23*)	.31* (.18*)	.29* (.22*)	–	.71* (.79*)	.64* (.74*)	.48* (.48*)	.33* (.37*)	.47* (.68*)
8. LS2 (Thinking)	.19* (.17*)	.16* (.04)	.18* (.09)	.08* (.18*)	.23* (.11*)	.21* (.09)	.76* (.77*)	–	.74* (.75*)	.50* (.39*)	.35* (.32*)	.46* (.59*)
9. LS3 (Interacting)	.12* (.10)	.10* (-.03)	.09* (.01)	.06 (.10)	.17* (.02)	.14* (.06)	.63* (.67*)	.78* (.79*)	–	.43* (.37*)	.30* (.26*)	.37* (.50*)
10. AP1 (PA Diversity)	.28* (.30*)	.18* (.15*)	.18* (.18*)	.11* (.24*)	.23* (.23*)	.25* (.33*)	.55* (.44*)	.52* (.42*)	.39* (.35*)	–	.64* (.73*)	.44* (.41*)
11. AP2 (Diverse Interest)	.18* (.17*)	.11* (.04)	.08* (.06)	.10* (.19*)	.17* (.19*)	.18* (.19*)	.44* (.32*)	.46* (.36*)	.40* (.31*)	.70* (.70*)	–	.19* (.28*)
12. MVPA	.24* (.18*)	.16* (.16*)	.17* (.12*)	.06 (.20*)	.23* (.11*)	.25* (.12*)	.65* (.61*)	.60* (.62*)	.45* (.48*)	.53* (.36*)	.39* (.30*)	–

Note. Grades 3–6 in top diagonal and Grade 7–9 in bottom diagonal. Time 1 only. MS = movement skill; FS = fitness skill; LS = living skill; MV = moderate to vigorous physical activity.

*$p < .01$.

Table 5
Component and Physical Activity Correlations by Year (2013–2014, 2014–2015) and Grade Level (3–6, 7–9)

Components	1 2013–14 (2014–15)	2 2013–14 (2014–15)	3 2013–14 (2014–15)	4 2013–14 (2014–15)	5 2013–14 (2014–15)
1. Movement Skills (3)	–	.52* (.39*)	.17* (.13*)	.18* (.16*)	.23* (.13*)
2. Fitness Skills (3)	.42* (.44*)	–	.15* (.19*)	.22* (.23*)	.15*(.17*)
3. Living Skills (20)	.26* (.15*)	.26* (.16*)	–	.53* (.46*)	.48* (.64*)
4. Active Participation (22)	.29* (.26*)	.27* (.33*)	.57* (.46*)	–	.42* (.41*)
5. MVPA (1)	.25* (.19*)	.23* (.17*)	.53* (.62*)	.55* (.38*)	–

Note. Grades 3 to 6 in top diagonal and Grades 7 to 9 in bottom diagonal. Time 1 only. MVPA = moderate to vigorous physical activity.

*$p < .01$.

Relations to Other Variables

A fourth source of validation evidence is the degree that subscale scores and/or their correlations relate to similar or associated variables concurrently or predictively measured by other instruments (AERA, APA, & NCME, 2014). Because this was a descriptive validation study of data from the initial uses of PFL, we did not statistically compare scores on PFL assessments to those on other previously validated instruments; however, we report validation evidence based on how each PFL scale and component relate concurrently. We also provide validation evidence as to the temporal (predictive) consistency in relations between the first and second year of data (2013–2014, 2014–2015) for each scale by developmental level.

Scale and component relations. As illustrated in Table 4, the majority of relations in both years of data for both developmental levels were significantly positive ($p < .01$). Across all data sets (level and year), the strongest scale relations existed between each of the movement and fitness skills, and between each of the living skills (feeling, thinking, and interacting) and active participation scales (PA diversity, diverse interest, and MVPA). Associations between the scales of the first two components (movement and fitness skills) and the latter two components (movement and fitness skills) were mixed. For example, locomotion was positively associated with all of the other scales except for diverse interest in 2013–2014 for the

Grade 3 to 6 sample and interacting in 2014–2015 for the Grade 7–9 sample. Relations between each of the scales and MVPA were also generally positive and significant ($p < .01$), although links between MVPA and active participation and living skills were notably higher than with fitness and movement skills. This pattern of scale relations was reinforced in the between-component and MVPA correlation, as presented in Table 5.

Temporal consistency of scale and component relations. None of the bivariate correlations for either year within Grades 7 to 9 were statistically negative, and 65 of the 66 paired correlations (e.g., relations between two scales in 2013–2014 compared to 2014–2015) differed by less than .15. This was slightly lower across the 2 years of Grade 3 to 6 data with 60 (90.9%) of the correlations differing by less than .15, and 47 of the 66 pairs (71%) being positive and statistically significant ($p < .01$). This temporal consistency was also evident in the relations between the components and MVPA, as depicted in Table 5, with each being statistically positive ($p < .01$) and 18 of the 20 paired correlations (90%) differing by less than .15. This suggests substantial temporal (predictive) consistency of the correlations across each scale and component over the 2 years of testing for both developmental levels.

Discussion

This paper served as a descriptive validity analysis for the use of PFL as a feasible formative criterion-referenced practitioner-based assessment of physical literacy. In line with the Standards (AERA, APA, & NCME, 2014), four broad sources of validation evidence were provided from the 2 years of PFL data in Grades 3 to 6 and Grades 7 to 9. First, score validity evidence based on the content of PFL included the development of PFL by a number of domain experts, the nature and format of the components and scales relative to existing literature and evidence, and the administrative procedures to guide teachers to implement it. Second, internal structure evidence attested to how well the instrument-specific items and their meanings aligned with each component construct and scale through indicators of normality, internal consistency reliability, factor structure, and test–retest reliability. Third, response process evidence included teachers' feedback, which generally demonstrated that the scores appear to reflect the construct, particularly through the way

that participants engaged with and understood the items. Finally, we explored relations with other variables within PFL and found substantial positive and significant within- and across-component relations. Substantial temporal (predictive) consistency in relations between scales and components over the 2 years of testing for both developmental levels was also evident. The results of this study of initial validation evidence support the delivery of PFL for its intended use, but we note several cautions and recommendations.

Critical in any validation analysis is a full consideration of the contextual purpose of the assessment. In essence, PFL is a series of assessments that represent cornerstone construct components of a broader physical literacy construct that is increasingly aligned with PE standards and outcomes (Mandigo et al., 2009; Ontario Ministry of Education, 2015; Roetert & MacDonald, 2015). In other words, the content of PFL aligns with PE outcomes and criterion standards that can be used to promote positive aspects of physical literacy such as learning, positive attitudes, and goal setting. Teachers are informed of these important PFL principles; particularly they should know and remind students that the assessments are for learning and improvement of each student's physical literacy and that students are comparing themselves to a criterion standard of physical literacy for their age group and not normatively to other students. The need to balance necessary psychometric properties with administrative usability qualities such as accessibility, relevance, financial and duration costs, clarity of instructions and scoring rubrics, and quality of resources such as a teachers' guide is also important. With the exception of a few thematic concerns such as duration and challenges in understanding some self-report items in the lower grades, teachers were generally satisfied with the administrative usability of PFL for themselves and their students.

The results from this study lend further credibility of the holistic nature of physical literacy. Similar to literacy being the ability of students not only to read and write but also to read and interact with their culture and environment (Whitehead, 2001), physical literacy is more than simply the physical skills needed to move. It involves the constant interaction between a person's physical abilities (e.g., movement and fitness skills); their motivation and desire to be physically active across a number of activities in multiple environments (e.g.,

active participation); and their confidence and competence to apply their skills, knowledge, and attitudes for themselves and with others on a daily basis (e.g., living skills). Most of the measures representing the various components of physical literacy in PFL correlated positively and significantly; this was particularly so between movement and fitness skills and between active participation and living skills. Although correlations between the physical measures and the affective and cognitive measures were somewhat mixed (particularly for younger participants), many of these relations were significantly positive. Collectively, these associations support the holistic nature of physical literacy consisting of psychomotor, health-related physical activity participation and fitness, and affective and cognitive learning outcomes embedded throughout PE curricula across Canada (Kilborn et al., 2016) and elsewhere (Lacy & Hastad, 2003; SHAPE America, 2014).

Because of the relative infancy of PFL, additional studies are needed to provide more robust validation evidence relative to its intended use. Intentional validation studies that provide much less duration between repeated measures (for test–retest reliability), test concurrent and predictive relations with relevant constructs using other measures, and compile ratings from a group of random experts in PE and physical literacy on the content relevance of PFL are needed.

A more rigorous analysis of each self-report item (e.g., think-aloud protocols), particularly relative to the lower grades, would also be useful. It appears that a significant portion of students may struggle with understanding the questionnaire items, which influences the response accuracy and hence the validity of those items and their respective scales and components (living skills and active participation). Future studies should also provide validation evidence pertaining to the fifth broad source of validation evidence (AERA, APA, & NCME, 2014), which was not included in this study, that is, linking the results of PFL to future intended or unintended consequences. Less stability in the test–retest reliability coefficients of several items in active participation and living skills for the Grade 3 to 6 sample may signal that younger students have difficulty accurately calibrating and reporting on these. Future PFL studies can also assess test–retest reliability of tests in closer tem-

poral proximity while investigating grade-level specificity responses by item and scale, particularly in Grades 3 to 6. Finally, although beyond the scope of this initial validation study, it would be useful to perform confirmatory factor analysis of the three living skills surveys, repeated measures analysis of variance procedures to determine change by year and grade, and structural equation modeling to better illustrate the nature and direction of relationships among the PFL constructs.

To add to the validation evidence for the intended use of PFL, it is important that the participant samples adequately represent the constituent members. These initial PFL data lack balanced representation across Canada (particularly the northern regions with a larger Inuit and Aboriginal population), and adequate accommodations have yet to be provided to individuals with special needs. There is also a lack of information on each participant's age, gender, province, ethnicity, grade, disability, and residence (urban or rural). A more robust scale for physical activity and MVPA also appears necessary, particularly for use as a criterion from which to compare each component and its scales.

PHE Canada has noted some of these needs (T. Zakaria, personal communication, November 11, 2015) and has recently increased the amount of demographic information that participants must report, has pilot tested an enhanced PFL program with optional adaptations embedded to accommodate individuals with particular needs (i.e., disabilities), and has moved participants in Grade 3 from the 3 to 6 program to a new program for kindergarten to Grade 3 students set to begin in September 2017. Among the adaptations is a simplified version of the self-report (living skills and active participation) items. Based on this study, it also appears necessary to revise the items on MVPA, intentions, and frequency of participating in individual sports and fitness activities at school or at home and in the community for Grades 3 to 6 because they may have difficulty relating to the wording of these items and accurately responding. There is also potential confirmability bias in this study because the lead author was involved in the design of several of the PFL assessments. Construct underrepresentation is also possible in PFL because each item can only reflect, not equate, with its intended scale or component or with physical literacy itself.

In conclusion, with an increased focus on the importance of physical literacy within PE settings, there is more of a need to provide students with formative feedback while they progress along their physical learning journey. Developed specifically for education settings and for educators, this study has provided initial validity evidence to support the continued use of PFL in Canadian schools. Like physical literacy, the concept of validity is a lifelong journey. Although no tool is free of measurement error and there are always areas for improvement as highlighted in this study, there is sufficient evidence to suggest that PFL is on the right path to helping inform Canadian children and adolescents of their current levels of physical literacy.

Armed with this information, parents, teachers, and students themselves will be in a better position to support children and adolescents. Further, children and adolescents will be better equipped to make informed decisions and become more physically literate individuals.

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PEDAGOGY

Physical Education Student Teachers' Technology Integration Self-Efficacy

Jennifer M. Krause

Abstract

Pre- and in-service physical education teachers have evaluated themselves as not being very well prepared or proficient in technology use. Thus, better preparation of PE teachers to integrate technology is necessary. In this study, I examined the effects of technology-related mastery experiences, vicarious experiences, and social persuasion on preservice PE teachers' self-efficacy to integrate technology during student teaching. The participants, 60 (32 females, 28 males) student teachers, completed the Computer Technology Integration Survey for Physical Education prior to and at the conclusion of the student-teaching experience. Student teachers' self-efficacy to integrate technology into physical education significantly improved over the course of student teaching, and positive relationships existed between experiences with technology (i.e., mastery experience, vicarious experience, and social persuasion) and self-efficacy to integrate technology.

Recent information on the availability, influence, and applications of educational technology has presented physical educators with opportunities and demands to integrate technology into the teaching and learning environment. The challenge for physical educators to respond to the needs of children of the new millennium has been growing (Gard & Wright, 2005). The technologies available that could benefit students and teachers in physical educa-

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tion (PE) classes, if applied appropriately, could meet the needs of these children. To use these technologies properly and to their full potential with students, teachers must first be proficient with using them. National organizations and governing bodies associated with teacher education have recognized the importance of educational technology integration, which has led to the establishment and constant revision of educational technology standards (Council for the Accreditation of Educator Preparation, 2013; International Society for Technology in Education [ISTE], 2008; National Association for Sport and Physical Education, 2008; National Board for Professional Teaching Standards, 2013). NASPE (2008) established a standard within planning and implementation dedicated to technology within the National Standards for Initial Physical Education Teacher Education, stating that PE teachers "demonstrate knowledge of current technology by planning and implementing learning experiences that require students to appropriately use technology to meet lesson objectives" (p. 2). The intent of this standard was to ensure that teacher candidates develop knowledge of and ability to implement current technologies to enhance learning with several outcomes. Physical education teacher education (PETE) programs have been held accountable for technology integration since 2001 with regard to accreditation, and therefore, accredited PETE programs must demonstrate how they meet this technology standard in preservice classes and field experiences.

Because of this demand, PE literature has been thoughtful in including strategies associated with technology integration in PE. Strategies on how to incorporate technologies, such as heart rate monitors and pedometers (Dunn & Tannehill, 2005; Nichols, Davis, McCord, Schmidt, & Slezak, 2009), tablets and smartphones (Cummiskey, 2011), and exergames (Mears & Hansen, 2009) into PE are abundant. With standards in place, PETE programs are tasked with an increasingly essential responsibility to produce technology-savvy PE teachers. It is evident that there are high expectations for teachers in terms of their ability to integrate technology effectively into their teaching. Still, there is a concern that today's teachers are not prepared to do so. Despite the availability of ideas and preparation plans, as well as having the importance of standards in place, many pre- and in-service PE teachers have evaluated

themselves as not being well prepared or proficient in technology use and have noted that better preparation of PE teachers is necessary (Gibbone, Rukavina, & Silverman, 2010; Jones, Bulger, Illg, & Wyant, 2012; Liang, Walls, Hicks, Clayton, & Yang, 2006; Woods, Goc Karp, Miao, & Pearlman, 2008). Many technologies are available that could be beneficial in PE classes. To introduce and utilize these technologies properly to their full potential, teachers must first be proficient with using them. Teachers' perceived self-efficacy, or beliefs about their abilities to integrate technology, may play a major role in this process.

Self-Efficacy Theory

Bandura (1997) described perceived self-efficacy as one's "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). The beliefs that preservice teachers have about their ability to integrate technology into their teaching therefore may influence future implementation as expected by the standards. In past studies, in- and preservice teachers evaluated themselves as not being well prepared to be proficient with integrating technology into their teaching. Researchers have listed a multitude of barriers to successful integration (Gibbone et al., 2010; Liang et al., 2006).

Preservice teachers' self-efficacy toward technology may be influenced by their knowledge, skills, and experiences with various technologies. According to Bandura (1986), self-efficacy beliefs are affected by several sources including (a) mastery experiences, (b) vicarious experiences, and (c) social persuasion (Figure 1). For example, a student teacher (ST) may observe (vicarious experience) a cooperating teacher (CT) successfully infuse pedometers in a fitness unit during which students increased physical activity, set goals, and kept track of their steps. This observation could then transfer to the ST's beliefs about his or her ability to do the same task and will have a positive effect. As a result, the ST may feel confident that infusing pedometers in his or her classes will also be successful. On the contrary, if an ST observes a CT unsuccessfully attempt to conduct a class in which the students wear heart rate monitors, the ST may interpret the unsuccessful integration as being too difficult to attempt on his

or her own and therefore avoid doing so. The same idea applies to the other sources of self-efficacy, whereby an ST may have a successful or unsuccessful mastery experience integrating certain technologies or may receive positive or negative feedback about his or her capabilities to integrate technology, which therefore directly affects the self-efficacy level. Given the context of the student-teaching placement, in which preservice teachers have the greatest opportunity for mastery and vicarious experiences in an authentic, school-based setting, I focused on the influence of sources on self-efficacy beliefs about technology integration in PE. Knowledge about how preservice PE teachers are being prepared to integrate technology into their teaching, especially during the student-teaching experience, is important for pinpointing which sources, such as mastery or vicarious experiences or social persuasion, might be most useful in establishing higher levels of self-efficacy.

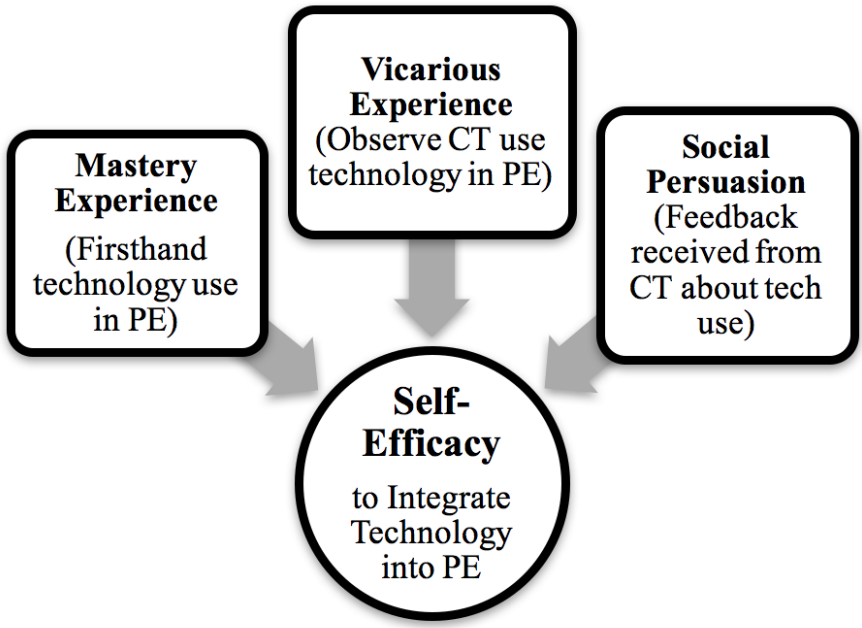

Figure 1. The relationship between the sources of self-efficacy and self-efficacy to integrate technology into physical education for preservice teachers. PE = physical education; CT = cooperating teacher.

Research on Technology Integration

Although a considerable amount of research on preparing preservice teachers to use and integrate technology has been done, there has been a lack of research on how PE preservice teachers perceive their ability to integrate technology into PE settings and, more important, what influences their perceptions. It was important in this study to assess preservice PE teachers' self-efficacy to integrate technology into their teaching, because a person's self-efficacy has been found to have a strong relationship with choice behavior, motivation, and persistence (Bandura, 1986). Researchers have applied self-efficacy theory in several areas, including sport, academic, and work performance and teacher efficacy. Study results in these areas suggest a positive relationship exists between the sources of self-efficacy and self-efficacy levels (Moritz, Feltz, Fahrbach, & Mack, 2000; Multon, Brown, & Lent, 1991; Stajkovic & Luthans, 1998).

Investigating the possible relationship between technology integration self-efficacy and the student-teaching experience with regard to the sources of self-efficacy may inform PETE preparation programs of the importance of selecting and providing experiences that foster positive efficacious beliefs and therefore improved choice behavior, motivation, and persistence among preservice teachers. Preservice PE teachers are exposed to technology now more than ever. Self-efficacy to integrate this technology into PE may have a viable effect on whether preservice teachers integrate technology appropriately or at all when they become in-service teachers. Bandura (1997) declared that self-efficacy beliefs are most in flux early in learning and tend to become fairly stable and resistant to change once set. For preservice teachers, who have few mastery experiences to draw upon, other sources of self-efficacy may be relevant in their self-assessments of efficacy, including vicarious experience and social persuasion. Insight into the influences through empirical studies on preservice PE teachers' self-efficacy through their student-teaching experience plays an important role in reforming the issues with technology training and in shaping technology curriculum development in PETE programs.

The purpose of this study was to explore preservice PE teachers' self-efficacy to integrate technology into their student-teaching experiences. I sought to explore primarily how preservice PE teach-

ers perceive their self-efficacy to integrate technology into PE at the beginning and end of their student-teaching experiences and potential differences between their levels of self-efficacy at these times. In addition, I aimed to determine whether a relationship existed between preservice teachers' degree of self-efficacy and technology integration experiences as measured by the sources of self-efficacy or other demographic factors in student teaching and, if so, which sources of self-efficacy were most influential to the level of self-efficacy to integrate technology.

Method

Participants and Setting

STs (n = 104) from nine colleges and universities who were enrolled in PETE programs in the Mid-Atlantic region of the United States were invited to participate in the study. A response rate of 71% yielded a sample of 60 participants (32 females, 28 males; M_{age} = 22.77, SD_{age} = 1.8; 95% Caucasian). Of the STs, 77% were enrolled in a bachelor's degree program, 22% were enrolled in a master's degree program, and 1% were enrolled in a program solely for teacher certification; all students were seeking PreK–12 licensure in physical education. There were no significant differences among undergraduate and graduate students in any tests, so I combined them into one group for this study. STs were assigned to either an elementary (56.7%) or a secondary (43.3%) grade level student-teaching placement in accordance with the procedures of their program. All participants provided informed consent in compliance with the university's institutional review board.

Instrumentation

In this study, I used a quantitative survey, the Computer Technology Integration Survey for Physical Education (CTIS-PE). The CTIS-PE was given to STs as a pretest (CTIS-PE-1) prior to beginning student teaching and posttest (CTIS-PE-2) at the end of their first student-teaching placement. The CTIS-PE-1 consisted of items related to (a) self-efficacy to integrate technology in PE, (b) personal demographic information, and (c) technology integration competency. I adapted the self-efficacy portion of the CTIS-PE survey from the previously validated Computer Technology Integration Survey

(Wang, Ertmer, & Newby, 2004). I used this 16-item, five-response Likert scale survey to measure preservice teachers' self-efficacy beliefs for technology integration. Participants were asked to rate their current level of confidence with statements regarding technology use (e.g., "I feel confident that I can select appropriate technology for instruction based on curriculum standards") on a scale of 1 to 5, with 1 = *strongly disagree,* 2 = *disagree,* 3 = *neither agree nor disagree,* 4 = *agree,* and 5 = *strongly agree*. The wording of the survey ("I feel confident…") met Bandura's (1986) recommendations for the construction of self-efficacy scales and was closely related to NASPE (2008) and ISTE (2008) standards for technology integration. To address the intended PE ST population appropriately, I made a few minor revisions of the instrument. These revisions helped to ensure that the language in the instrument was parallel to that of a physical educator. Experts with experience in the combined areas of self-efficacy, PE, and survey instrumentation reviewed the survey for content and construct validity. Cronbach's alpha reliability estimates for this study were .953 (CTIS-PE-1) and .951 (CTIS-PE-2). In addition, the internal consistency of the technology training measure was .873.

The CTIS-PE-1 includes demographic items such as age, gender, race, program level (e.g., bachelor, master), and student-teaching grade level of the first placement. The CTIS-PE-1 also asked participants to rate their level of technology integration competency derived from their PETE program on a scale of 1 to 4, with 1 = *untrained (little or no experience learning the tool)*, 2 = *trained (have been taught or learned on own)*, 3 = *highly trained (consider self to be highly competent in the tool)*, and 4 = e*xpert (have successfully used the tool in teaching PE)*. I selected the technology integration knowledge tools from the Physical Education Technology Use Survey for Physical Education Teachers (Woods et al., 2008) because of their specific uses for PE. The final question asked STs to select the environment(s) in which they learned to integrate technology in PE during their PETE program. Selections included (a) single general technology course, (b) PE-specific technology course, (c) infusion throughout several methods courses, (d) practicum or other school-based field experience, (e) professional conference or workshop, and (e) other.

The CTIS-PE-2 consists of items related to (a) self-efficacy to integrate technology in PE (posttest for self-efficacy), (b) school placement demographic information, and (c) technology integration experiences from their first 6- to 8-week student-teaching experience. This instrument requested participants to supply information about any technology integration requirements and expectations that they had gained from others about student teaching. In addition, the CTIS-PE-2 asked participants to rate their level of success with integrating technology in PE during their first student-teaching placement, on a five-item Likert scale from *very unsuccessful* to *very successful*. The technology integration experiences were based on three sources of self-efficacy: (a) mastery experiences, (b) vicarious experiences, and (c) social persuasion (presented in the form of feedback from others). Participants also provided demographic information about their student-teaching placement including (a) school level; (b) total number of students in the school; (c) school socioeconomic status; (d) community environment; (e) average number of students per PE class; and (f) CT age, gender, and number of years teaching. Finally, participants indicated the number and frequency of use of technologies such as pedometers, video cameras, and computers that were available to the PE departments at their first student-teaching placements.

Data Collection and Analysis

I made personal visits to all nine colleges and universities to recruit participants approximately 1 week prior to the start of the first student-teaching placement, at which time STs who agreed to participate completed the CTIS-PE-1. I requested that all participants supply a valid e-mail address on the initial questionnaire. Then via e-mail I contacted those who supplied this information on a schedule specific to their student-teaching placement. I sent the link for the online CTIS-PE-2 to the participants via e-mail during the last week of their first student-teaching placement. Participants' first student-teaching placement lasted 6 to 8 weeks, depending on the college or university schedule.

I analyzed data using SPSS (version 20). I used descriptive statistics and paired *t* tests (significance levels at $\alpha \leq .05$) to analyze demographic and individual response item data on the CTIS-PE instruments. I used

hierarchical multiple regression to analyze the possible relationship between sources of self-efficacy and the overall self-efficacy scores.

I calculated self-efficacy scores from the CTIS-PE-1 and CTIS-PE-2 questionnaires and averaged for each scale. The higher the score was, the more confident the preservice teachers were about their ability to integrate technology into student teaching. To determine the levels of self-efficacy, I averaged responses from the self-efficacy scale. To determine if there was a difference in self-efficacy scores from the beginning to the end of student teaching, I calculated a paired samples *t* test. I analyzed self-efficacy scores, sources of self-efficacy scores (i.e., mastery experience, vicarious experience, and social persuasion), and demographic factors by conducting Pearson's correlational analyses to determine possible relationships.

I performed hierarchical multiple regression to determine how well the three sources of self-efficacy explained the variance in self-efficacy to integrate technology. I placed mastery experience in Step 1 of the model, followed by vicarious experience in Step 2 and social persuasion in Step 3. I selected the placement order of variables in the steps with reference to Bandura's (1986) theory that described mastery experience as the most influential source of self-efficacy, followed by vicarious experience and then social persuasion. Finally, I performed a hierarchical multiple regression to determine if mastery experience explained any of the variance after controlling for significantly correlated demographic variables (i.e., technology training).

Results

Descriptive Information on Participants and Their Placements

STs reported levels of training with technology as untrained ($n = 1$), trained ($n = 26$), highly trained ($n = 30$), and expert ($n = 3$). Overall, STs fell between trained and highly trained with technology prior to beginning their placements ($M = 2.49$, $SD = .552$). I also collected demographic data with regard to the student-teaching placements. STs were placed in rural (45%), suburban (37%), and urban (18%) schools. Classes averaged 23.65 students ($SD = 4.27$) and 51.4 min ($SD = 22.84$). I also collected CT characteristics for age ($M = 41.88$, $SD = 10.21$), gender (48.3% female, 51.7% male), and years teaching ($M = 17.07$, $SD = 9.98$). For the availability of tech-

nology tools at placements, as indicated by participants, the most widely available technologies across schools (n = number of schools where the technology was available) were computers for teacher use (n = 50), computers for student use (n = 33), pedometers (n = 30), and video cameras (n = 30). Of the schools that had provided technology tools, on average they had 22 computers for student use (SD = 12.0), 25 pedometers (SD = 10.0), and eight digital video cameras (SD = 8.0). On a daily basis, 66.7% of STs used computers for teaching, 13.3% used pedometers, and 10.7% used computers with students. Finally, participants reported levels of success for each source of self-efficacy. Of the 60 participants, 88.3% reported having mastery experiences, 88.3% reported having vicarious experiences, and 78.3% reported receiving feedback from others regarding use of technology at their school placements. Based on a 5-point scale, participants rated their mastery experiences (M = 4.32, SD = .80), vicarious experiences (M = 4.21, SD = .970), and social persuasion (M = 4.21, SD = .907) as successful. Participants who reported no experience were not included in analysis for that variable.

Change in Self-Efficacy Beliefs

STs reported a slight but significant increase in self-efficacy to integrate technology in PE over the course of one 6- to 8-week student-teaching placement. I analyzed the self-efficacy scores from the CTIS-PE-1 and CTIS-PE-2 using a paired samples t test. I found a statistically significant increase in self-efficacy scores (N = 60) from the beginning (M = 3.90, SD = .581) to the end (M = 4.12, SD = .069), $t(59) = 3.04$, $p < .01$, of the first student-teaching placement (two-tailed). The mean increase in self-efficacy scores was .223 with a 95% confidence interval from .370 to .076. The eta-squared statistic ($\eta^2 = .14$) indicated a large effect size according to Cohen's (1988) guidelines for interpretation, indicating a substantial difference in the self-efficacy scores before and after student teaching.

Relationships Among Sources of Self-Efficacy and Other Factors

I computed correlations to identify the relationships among the three sources of self-efficacy and the criterion variable of self-efficacy to integrate technology in PE calculated from the CTIS-PE-2. I performed preliminary analyses to ensure no violation of the assump-

tions of normality and linearity. Of the Pearson product–moment correlations computed on sources of self-efficacy, all of the predictor variables displayed strong, positive correlations and were statistically significant at the $p < .01$ level. The correlation coefficients for each predictor variable with self-efficacy and with one another indicate strong correlations, according to Cohen (1988). Mastery experience produced a correlation of $r = .465$, $n = 52$. Vicarious experience produced a correlation of $r = .433$, $n = 52$. Social persuasion produced a correlation of $r = .412$, $n = 46$. The statistics for each source (i.e., mastery, vicarious, social persuasion) indicated a score drawn from the number of STs who reported experiencing each variable.

In addition, I computed correlations to identify relationships between demographic factors, technology training, school placement factors, and technology availability and with self-efficacy scores. Pearson product–moment correlations computed on these variables showed that self-efficacy had a strong relationship with the level of technology training ($r = .499$, $p < .01$). No other variables (e.g., age, gender, race, program, school placement) produced significant correlations with self-efficacy or one another. Table 1 presents results of significantly related variables in an intercorrelation matrix, along with means and standard deviations.

Table 1
Means, Standard Deviations, and Intercorrelations for Self-Efficacy, Source, and Training Measures

Measure	*M*	*SD*	1	2	3	4	5
1. Self-Efficacy	4.12	.54	–				
2. Mastery	4.32	.80	.47**	–			
3. Vicarious	4.21	.97	.43**	.63**	–		
4. Social Persuasion	4.21	.91	.41**	.64**	.59**	–	
5. Technology Training	2.50	.55	.46**	.14	.18	.13	–

Note. Self-efficacy measure was taken from CTIS-PE-2.
**$p < .01$ (2-tailed).

Predictors of Self-Efficacy

I conducted a hierarchical linear multiple regression analysis to assess the ability of the sources of self-efficacy (mastery experience, vicarious experience, and social persuasion) to predict levels

of STs' self-efficacy (CTIS-PE-2) to integrate technology into PE. I conducted preliminary analyses to ensure no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity. I entered mastery experience at Step 1 on account of Bandura's (1997) self-efficacy theory, which states that mastery experience is the strongest predictor of self-efficacy. Mastery experiences also had the strongest relationship with self-efficacy ($r = .499$) among all other variables in the previous correlation analysis in this study. Mastery experience explained 21% of the variance in self-efficacy. I entered vicarious experience at Step 2, which explained an additional 4.4% of the variance in self-efficacy after controlling for mastery experience. I entered social persuasion at Step 3, which explained an additional 1% of the variance in self-efficacy after controlling for mastery and vicarious experiences.

All three models were statistically significant ($p < .01$); however, the only model that included a statistically significant variable was the first model, which included mastery experience ($\beta = .46$, $p < .01$) as the only predictor. After entry of mastery experience at Step 1, the model explained 21% of the variance in self-efficacy, $F(1, 40) = 10.61$, $p < .01$. In this case, Steps 2 and 3 did not contain statistically significant variables. The three independent variables in this regression model were strongly correlated, with Pearson's r values ranging from .59 to .64, as shown in the correlations matrix; therefore, there is greater shared variance that is statistically removed when they are all included in the models from Step 2 and Step 3. Table 2 shows the results of the multiple regression analysis.

Table 2

Hierarchical Regression Analysis Summary for Source Variables Predicting Preservice Teachers' Self-Efficacy (N = 42)

Step and predictor variable	B	*SE* B	β	R^2	ΔR^2
Step 1: Mastery experience	.33	.10	.46**	.21**	
Step 2: Vicarious experience	.166	.11	.28	.25**	.04
Step 3: Social persuasion experience	.09	.12	.14	.26**	.01

**$p < .01$.

I again used hierarchical multiple regression to assess the ability of mastery experience to predict levels of self-efficacy, after controlling for the influence of prior technology training (Technology Training Scale from CTIS-PE-1). I again conducted preliminary analyses to ensure no violation of assumptions for multiple regression. I entered technology training at Step 1, which explained 19% of the variance in self-efficacy. After entry of mastery experience at Step 2, the model as a whole explained 36% of the total variance, $F(2, 49) = 14.0$, $p < .001$. Mastery experience explained an additional 17% of the variance in self-efficacy, after controlling for technology training, R^2 value change = .17, F statistic change (1, 49) = 13.15, $p < .01$. In the final model, both of the control measures were statistically significant, with mastery experience recording a higher beta value ($\beta = .42$, $p < .01$) than technology training ($\beta = .39$, $p < .01$). Table 3 shows the results.

Table 3
Hierarchical Regression Analysis Summary for Technology Training and Mastery Experience Predicting Preservice Teachers' Self-Efficacy (N = 52)

Step and predictor variable	B	*SE* B	β	R^2	ΔR^2
Step 1: Technology training	.45	.13	.39**	.19**	
Step 2: Mastery experience	.29	.08	.42**	.36***	.17**

**$p < .01$. ***$p < .001$

Discussion

Difference in Self-Efficacy Beliefs

In this study, I measured self-efficacy beliefs toward integrating technology in PE at the beginning and end of the first student-teaching placement. STs began their experiences with positive self-efficacy to integrate technology ($M = 3.9$). This result is not consistent with results from with previous studies with preservice teachers. Liang et al. (2006) reported that PE majors at the pre-student-teaching stage in their careers did not highly estimate their ability to integrate technology, with a majority of the participants (51.3%) reporting in the "minimally (need help)" category. The second occurrence of the self-efficacy measure in this study, obtained

from the CTIS-PE-2 questionnaire, indicated that STs completed their first student-teaching placement experience with significantly higher self-efficacy beliefs (M = 4.1) to integrate technology in PE than when they first began. This result is also inconsistent with results in previous research on preservice PE teachers' beliefs about their ability to integrate technology. Liang et al. (2006) also measured the perceived ability of preservice PE teachers at the point of initial licensure, just after completion of their student-teaching experience. This resulted in a majority of the participants (61.1%) reporting in the "minimally (need help)" category. These comparisons, however, should be approached with caution because the measures for ability were not equal and Liang et al. compared two groups, rather than one group at two points. In this case, there is no way to know if those preservice teachers' beliefs would have changed over time. In addition, it was unclear whether the participants in Liang et al.'s (2006) study represented all or only a portion of the PE majors, whereas the participants in this study were volunteers and may have elected to be a part of the study because they were more likely to use technology.

Aside from previous research with preservice teachers, this study can also be compared with research including in-service teachers. For example, Woods et al. (2008) investigated the technology use and competencies of in-service PE teachers. The results of Woods et al.'s study had similarities and differences to the results of this study. In the in-service teachers study, Woods et al. reported PE teachers' perceptions of their own competency with individual technology tools for general education and for PE. Woods et al reported frequencies and found that teachers felt more competent with technologies related to general education than those related specifically to PE. The teachers reported a range of competencies in PE-related technologies. The results of this study should be compared with the results of Woods et al.'s study with caution. The major constructs of the two studies, self-efficacy and competence, although many times used interchangeably, are different. The overall theme, however, of both studies is similar. The preservice teachers in this study rated themselves to be confident in their ability to integrate technology in PE. This result is consistent with some of the individual results of Woods et al.'s study.

Results of this portion of the study should be approached with caution. The teachers in Liang et al.'s (2006) study and Woods et al.'s (2008) study were not as confident in their ability to integrate technology as those in this study. It is important to recognize that with the fast growth and use of technology in society, today's preservice teachers may have more experience with technologies and therefore may be more technology-savvy than teachers in earlier studies, as noticeable in their technology training levels. The preservice teachers in Liang et al.'s (2006) study did not have any technology training in their programs prior to the study. Although there was a statistically significant increase in self-efficacy in this study, there may still be the question of whether 0.2 points is a meaningful difference. The participants in this study were volunteers, and those who chose to complete the questionnaires may have been more likely to use technology successfully. In addition, the change in self-efficacy may have been due to participants having completed questionnaires throughout their placements or answering the questions in a socially desirable way rather than by what was true. Finally, I treated the data for the self-efficacy scale as continuous. If I had treated the data as categorical and analyzed the frequency by rating, the results could have shown no difference in scores. In addition, I selected measures and tests to maintain fidelity to the analysis of the original self-efficacy scale (Wang et al., 2004).

Relationship Between Self-Efficacy Beliefs and Sources

The Pearson's *r* correlation analyses indicated that self-efficacy to integrate technology was highly correlated with mastery experience, vicarious experience, and social persuasion, with regard to technology integration during student teaching. In addition, each of the sources of self-efficacy was highly correlated with the other. One hierarchical multiple regression indicated that mastery experience accounted for 21% of the variance in self-efficacy, with vicarious experience and social persuasion adding only an additional 5% that was not statistically important. The lack of a statistically significant additional variance explanation by vicarious and social persuasion experiences may be misleading. Correlational analyses indicated a strong, positive relationship among the three sources of self-efficacy, and although not meeting the levels of multicollinearity, the variables may have influenced one another. It is clear that the variables

are related, but they are so closely related that one will not add any extra explanation of variance to the results.

Based on the results of an additional multiple regression, mastery experience explained 17% of the variance in self-efficacy, when controlling for prior technology training. Combined, these two variables explained 36% of the variance in self-efficacy. These quantitative analyses resulted in further investigation of the variables, as discussed in the following section.

Bandura (1986, 1997) hypothesized that self-efficacy beliefs develop, can be instilled, and can be strengthened as people interpret information from several sources: (a) enactive mastery experiences, (b) vicarious experiences, and (c) verbal/social persuasion. The most powerful source of self-efficacy is mastery experience, defined as one's interpretations of his or her own previous, authentic experiences performing a particular task. Bandura (1997) suggested a successful mastery experience will improve one's personal efficacy and an unsuccessful mastery experience will weaken it, especially if a firm sense of efficacy has yet to be constructed. For the preservice teachers in this study, Bandura's self-efficacy theory appears to hold true to some degree. Self-efficacy increased over the course of the student-teaching placement and mastery experience explained a significant amount of the variance in self-efficacy to integrate technology. In addition, a majority of STs indicated having successful mastery ($M = 4.32$), vicarious ($M = 4.21$), and social persuasion ($M = 4.21$) experiences with technology integration during their ST placements. These successful experiences were consistent with Bandura's explanation that strong self-efficacy antecedents will strengthen one's self efficacy and adverse efficacy antecedents will weaken one's self-efficacy (Bandura, 1986, 1997). In this study, it may be concluded that the strong, positive experiences or antecedents may have strengthened the preservice teachers' self-efficacy to integrate technology, to some extent.

Most of the results of these analyses were consistent with the results of some previous studies investigating the relationship between sources of self-efficacy and self-efficacy beliefs. Martin, McCaughtry, Kulinna, Cothran, and Faust (2008) investigated the effects of a yearlong mentoring-based professional development program on PE teachers' self-efficacy to use pedometers and computers. After participants were engaged in mastery experiences and

given regular social persuasion, they substantially increased their self-efficacy. A majority of the other technology-related studies in the literature involving sources of self-efficacy included only one source: vicarious experience. For example, Wang et al. (2004) investigated how vicarious experiences and goal setting affected preservice teachers' judgments of self-efficacy for technology integration. They found that preservice teachers who were exposed to vicarious experiences that were related to successful technology integration with and without goal setting had significantly greater increases in self-efficacy judgments for technology integration than did those who were not exposed to vicarious experiences.

The result that training was a significant predictor of self-efficacy aligns with the notion that several factors influence teachers to use technology, including availability and access to technology, teacher preparation and training, leadership, and time to learn and prepare for technology integration (Franklin, 2008). Evidence suggests, however, that teachers' beliefs about their ability, or self-efficacy to integrate technology in teaching, may be a significant factor in determining technology integration levels (Albion, 1996; Oliver & Shapiro, 1993), as was the case in this study, with mastery experiences explaining more variance in overall self-efficacy. These results involving training should be approached with caution. The 10 questions that investigated technology training had participants provide their perceived training levels, not their actual levels of competence. Because a standard training measure was not available, I constructed a measure that reflected technologies that were presented in other PE literature. It would be ideal to construct a valid, reliable, and standard measure of technology competency for future investigations in PE.

The remaining unexplained variance in self-efficacy may have been affected on a practical level. For example, placement demographics such as school level, access, and frequency and duration of meetings, although not showing statistical significance, may have affected whether preservice teachers utilized technology and how often. In addition, the CTs' behavior, attitudes, and direction of technology use may have had an effect. Expectations from the university or college program, university supervisor, and CT may have also had an effect. This variable was originally investigated on the CTIS-PE-2; however, the data retrieved from this question were

unusable. It appeared as if participants did not fully understand the question, even though it was accepted in the pilot study. In addition, classroom management skills of the preservice teachers may have affected whether they could feasibly distribute and use the technology in conjunction with pedagogy and content or with large groups of students.

Conclusion

The results from this study suggest several conclusions regarding preservice PE teachers' self-efficacy to integrate technology during student teaching. STs began student teaching with positive self-efficacy beliefs to integrate technology in PE, and their self-efficacy levels increased by the end of their first student-teaching placement. In addition, student-teaching mastery experiences, vicarious experiences, and social persuasion about technology integration during their student-teaching placement, as well as prior technology training, were highly related to their self-efficacy levels. Each of these variables, with mastery experience with technology during student teaching and prior technology training having individual significance, predicted STs' self-efficacy to integrate technology, to some degree. STs had access to a variety of technologies during their ST placements and a majority of their experiences were successful.

The results of this study inform the PETE community of the possibility of mastery experiences, vicarious experiences, and social persuasion affecting self-efficacy to integrate technology, to some degree. There may be practical implications for PETE programs involved in preparing teachers to use and integrate technology for teaching and learning in PE. Program coordinators and fellow PETE faculty may plan their professional preparation programs to include training plans involving a multitude of opportunities for mastery experiences with technology in the context of teaching PE. In addition, faculty modeling and other vicarious learning experiences may be included. Regular, constructive social persuasion to preservice teachers may also be helpful in building their confidence. PETE faculty who are tasked with student-teaching placement responsibilities may attempt to place students with CTs who successfully employ, when appropriate, technology tools in their planning, teaching, and assessment and who will serve as good models for STs. Also, selecting schools with or even assisting schools with obtaining technology

tools for instruction may be beneficial not only to the school but also to the STs because more opportunities for technology integration practice will be in place. Additionally, the findings of this study may encourage PETE faculty to incorporate classes specific to technology in PE or infuse technology throughout the coursework in their programs. Finally, PETE programs may create or revise requirements for STs with regard to the frequency or quality of technology integration practice during the student-teaching experience, which would then encourage more attempts, or mastery experience with technology, and therefore encourage proper training ahead of time.

In the future, researchers should investigate self-efficacy as a potential predictor of future behavior with regard to technology integration in PE, as hypothesized by Bandura (1997). In addition, because of CTs major influence in the student-teaching placement, an investigation of CTs' attitudes and behaviors toward technology may be warranted. Finally, because the results of this study show that technology training has a significant influence on self-efficacy, it may be important to investigate PETE programs that claim to be preparing students well to integrate technology in PE teaching and learning, to establish a model for others.

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PEDAGOGY

Using a 3-Day Physical Activity Recall as Homework to Increase Physical Activity in Rural Appalachian School Youth: A 3-Week Pilot Intervention Program

Hyun-Ju Oh and Sharon Rana

Abstract

The purpose of this study was to examine the effect of a 3-Day Physical Activity Recall (3DPAR) intervention program on the physical activity (PA) levels of rural Appalachian school youth. To the best of our knowledge, this is the first study in which the pre- and postlevel of PA in rural Appalachian school youth has been assessed following a 3DPAR intervention program. A sample of 76 school youth (M_{age} = 13.3 years) recruited from three secondary schools in the Appalachian region was included in the final analyses. To assess intervention effects such as steps per day and moderate to vigorous PA (MVPA) minutes per day, we had participants wear sealed NL-1000 piezoelectric pedometers for 7 days at pre- and posttest. For this 3-week pilot intervention, participants recorded daily activity using a 3DPAR self-report instrument. Participants received two educational sessions during the first three classes of the intervention period. We utilized a MANOVA to determine the effects of intervention participation on pre- versus posttest for the whole week, weekdays, and weekends. Youth who completed the 3DPAR-delivered intervention significantly increased their step counts on the weekends. Future studies should evaluate whether a longer intervention including a control group could result in improving PA over the long term.

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Background

Substantial health benefits of regularly participating in physical activity (PA) in daily life and quality physical education (PE) classes have been well documented (Institute of Medicine [IOM], 2013; U.S. Department of Health and Human Services [USDHHS], 2008). The current PA guidelines for youth aged 6 to 17 years recommend at least 60 min/day of moderate intensity activity (Strong et al., 2005; USDHHS, 2008); however, many youth do not meet the recommended PA guidelines (Troiano et al., 2008). For example, only 34.7% of youth in Grades 9 to 12 meet the current PA guidelines (Centers for Disease Control and Prevention [CDC], 2010).

Underrepresented youth are typically inactive (Oh & Rana, 2014; Sutherland et al., 2015). Appalachia is one of the poorest and most medically challenged regions in America (Behringer & Friedell, 2006). Appalachian regions have the highest level of mortality rates, obesity, and inactivity in America (Borak, Salipante-Zaidel, Slade, & Fields, 2012; Gregg et al., 2009; Wewers et al., 2000). The most recent data show that school youth living in the southeastern region of Appalachia are insufficiently active (Oh & Rana, 2014). In addition, only 5% of rural Appalachian adolescents meet the recommended 60 min/day of PA time (Hortz, Stevens, Holden, & Petosa, 2009).

Various interventions have been used to increase PA in diverse settings and with diverse population groups. The informational approach to improve PA has been promising; in this approach, the individuals are provided with specific PA and exercise information related to making informed decisions about healthful lifestyles (Kahn et al., 2002). Pedometer-based interventions targeted to promote PA in students have been introduced (Hart, Brusseau, Kulinna, McClain, & Tudor-Locke, 2011; Lubans, Morgan, Callister, & Collins, 2009; Raedeke, Focht, & King, 2013; Shimon & Petlichkoff, 2009; Zizzi et al., 2006). One study incorporated eHealth technology along with self-monitoring strategies into a pedometer-based intervention, and youth showed higher step counts after the intervention (Lubans et al., 2009). However, strategies and interventions using the 3DPAR instrument with the intention to promote awareness and knowledge of current PA guidelines for school youth in rural Appalachian regions have not been studied. Simple, practical, and

inexpensive PA intervention strategies are especially critical in these rural areas.

A quality PE class in school is a focal place to educate students to be physically literate people who demonstrate the knowledge and skills to sustain and improve a health-enhancing PA level (National Association for Sport and Physical Education [NASPE], 2013; Slater, Nicholson, Chriqui, Turner, & Chaloupka, 2012). With more than 95% of youth enrolled in U.S. schools (National Center for Education Statistics [NCES], 2001), it would seem profitable that physical educators teach students to make informed decisions about their activity and lifestyles (IOM, 2013).

Implementing an effective intervention to increase PA among school youth using an educational basis such as school has been promising in the literature. Therefore, the purpose of this study was to examine the effects of a 3-Day Physical Activity Recall (3DPAR) intervention program on the PA levels of rural Appalachian school youth. The 3DPAR self-report instrument has been validated in school-aged youth and found to be appropriate for school-based studies, yielding a valid reflection of usual daily PA (Pate, Ross, Dowda, Trost, & Sirard, 2003; Trost, Ward, McGraw, & Pate, 1999; Weston, Petosa, & Pate, 1997). To the best of our knowledge, this is the first study in which the pre- and postlevel of PA in rural Appalachian school youth have been assessed following a 3DPAR intervention program during which the 3DPAR instrument was utilized as homework. Specifically, we hypothesized that participants who completed the 3DPAR homework during a 3-week intervention program (completers) would demonstrate higher levels of PA as measured by pedometer step counts and activity time than those who did not complete the 3DPAR homework during the intervention program (noncompleters). The completers of this intervention completed all the pedometer data collection, attended two educational sessions, and completed 3DPAR on a weekly basis, whereas noncompleters completed all the pedometer data collection and attended two educational sessions, but they did not complete the 3DPAR over the 3-week intervention.

Method

Study Design

The university institutional review board approved the study protocol. Parents of participants 11 to 17 years old and participants 18 years old or older signed a consent form to participate in this study. Data sources for this study included a demographic questionnaire, student engagement in PA as measured through pedometers, and self-reported engagement in daily PA as measured by the 3DPAR self-report instrument.

The data collected for this study were confidential and used only for data collection purposes. Prior to the start of the study, the research team completed training required by the institutional review board and the primary investigator presented the team with an overview of the study protocol.

Based on a previous study (Oh & Rana, 2014), this pilot intervention was designed to improve PA levels of rural Appalachian youth. We used the nonprobability sampling method to select participating schools in the southeastern area of rural Appalachia. We collected data at one high school and two middle schools in regularly scheduled PE classes of three PE teachers. The region of Appalachia where we conducted our intervention is economically disadvantaged (Oh & Rana, 2014); also refer to Table 1.

Table 1
Descriptive Characteristics by Completion of the Intervention

Variable	Completed intervention (n = 41) $M \pm SD$ or n (%)	Did not complete intervention (n = 35) $M \pm SD$ or n (%)
Age (year)	13.2 ± 1.3	13.5 ± 1.8
Weight (kg)		
Girls	61.0 ± 24.4	74.6 ± 23.1
Boys	59.9 ± 12.9	58.0 ± 21.9
Height (cm)		
Girls	159.5 ± 10.3	160.5 ± 7.1
Boys	162.3 ± 10.2	161.2 ± 13.3

Table 1 (cont.)

Variable	Completed intervention (n = 41) $M \pm SD$ or n (%)	Did not complete intervention (n = 35) $M \pm SD$ or n (%)
Gender		
Girls	17 (41.5%)	16 (45.7%)
Boys	24 (58.5%)	19 (54.3%)
Parental Education		
< High school	2 (4.9%)	3 (8.6%)
High school	16 (39.0%)	16 (45.7%)
Some college/2-year college	13 (31.7%)	9 (25.7%)
4-year college	4 (9.8%)	5 (14.3%)
Some graduate school	2 (4.9%)	1 (2.9%)
Professional/doctorate	2 (4.9%)	1 (2.9%)
Did not answer	2 (4.9%)	0 (0%)
Household income		
< $15,000	9 (22.0%)	5 (14.3%)
$15,000–$25,000	7 (17.1%)	8 (22.9%)
$26,000–$35,000	4 (9.8%)	4 (11.4%)
$36,000–$45,000	2 (4.9%)	3 (8.6%)
$46,000–$55,000	1 (2.4%)	4 (11.4%)
$56,000–$65,000	1 (2.4%)	1 (2.9%)
> $66,000	5 (12.2%)	3 (8.6%)
Prefer not to answer	10 (24.4%)	5 (14.3%)
Did not answer	2 (4.9%)	2 (5.7%)

It took 6 weeks to complete this intervention study at each school, including study explanation (first week), preintervention data collection (second week), intervention (third, fourth, and fifth weeks), and postintervention data collection (sixth week). The participants received two educational sessions during the first three classes of the 3-week pilot intervention. Overall, this study occurred over 10 months in that it was implemented one school at a time. The study

did not alter participating schools' PE curriculum and grading policy, except for the educational sessions.

Participants

All students in Grades 6 to 12 in the three participating schools located in the southeastern area of rural Appalachia were given an opportunity to participate in this study. The PE teachers in these schools supported the implementation of this study, specifically the use of the 3DPAR self-report instrument and pedometers during the intervention phase of the study. Students in the participating schools received 45 min of PE daily in a coeducational setting.

Instruments

Demographic questionnaire. Parents of the 11- to 17-year-old participants and participants 18 years or older completed a demographic survey, reporting age, grade level, gender, and parents' annual income and educational attainment. Participants were not included if they were physically ill, took medications that could affect their regular PA participation, or had any injury that required daily activity restrictions.

Pedometers. New Lifestyles NL-1000 pedometers (New Lifestyles Inc., Lees Summit, MO) were used to measure student PA levels during the intervention phase of the study. Researchers have found these pedometers to be valid and reliable when used with youth (Hart et al., 2011); the NL-1000 employs a piezoelectric accelerometer mechanism that can automatically record step counts for up to 7 days and moderate to vigorous PA (MVPA) time in 1-day epochs. Unlike traditional spring-levered pedometers, piezoelectric pedometers have been found to count steps within ± 3% actual steps accumulated, 95% of the time, regardless of weight status (Schneider, Crouter, Lukajic, & Bassett, 2003). Piezoelectric pedometers are also more accurate than traditional spring-levered pedometers for overweight and obese people who move at slower walking speeds (Crouter, Schneider, & Bassett, 2005).

Prior to data collection, we changed each NL-1000 pedometer battery used for this study and performed a series of shake tests to check for defects. Participants wore the sealed NL-1000 piezoelectric pedometers for 7 consecutive days pre- and postintervention to prevent the possibility of data loss. We collected the pedometer data

for 7 consecutive days and used these as a baseline measure of PA. We taught students how to wear the sealed New Lifestyles NL-1000 pedometer and asked them to wear the pedometer on the right side of their belt or their waistband at the midline of the thigh all day for 7 days except while sleeping and during any water-based activities. In a PA log, the participants recorded the time that they put on and took off the pedometer.

Upon completion of the pre- and posttest, we recorded the participants' number of step counts and MVPA time (i.e., average step counts per day and average MVPA minutes per day) in a computer. To be included in the analysis, participants must have had at least 2 weekdays and 1 weekend day of valid pre- and postintervention data, as suggested by Rowe, Mahar, Raedeke, and Lore (2004; $\geq$ 1,000 & $\leq$ 30,000 step counts/day); we also used Colley, Janssen, and Tremblay's (2012) 12,000 daily step recommendation to determine whether participants in this intervention study met these pedometer guidelines. The primary focus of this study was to determine the sole effectiveness of the intervention; therefore, we did not provide pre-pedometer information to the participants. However, we provided pedometer step information after the posttest to those who completed the intervention.

Intervention educational sessions. The principal investigator developed the topics and materials for the two sessions using the 3DPAR self-report instrument (Trost, Ward, McGraw, & Pate, 1999; Weston, Petosa, & Pate, 1997) and the PA guidelines for youth available at the CDC website (2012). Accordingly, based on the developed materials, the PE teachers and research team members presented the following information to the students during PE class: (a) currently recommended daily PA guidelines for youth (e.g., intensity, duration, frequency, and type of PA), (b) health effects of PA, (c) strategies to improve students' current PA level, and (d) how to monitor their PA levels using the 3DPAR self-report instrument (Pate et al., 2003; Trost et al., 1999; Weston et al., 1997).

The 3DPAR self-report instrument. For the 3-week intervention program, participants recorded daily activity using the 3DPAR self-report instrument. The 3DPAR self-report instrument has been validated in school-aged youth and found to be appropriate for school-based studies, yielding a valid reflection of usual daily PA (Pate et al., 2003; Trost et al., 1999; Weston et al., 1997). Fifty-nine

common activities, each of which corresponds to a number with photos explaining duration, intensity, and type of PA that would contribute to the recommended guidelines for PA, are included in the 3DPAR instrument.

In this study, we used the 3DPAR instrument as homework to teach the participants about the current recommendations for daily PA and how to monitor their daily PA levels. For homework, the students were simply required to record the PA that they performed each day; there was no mandate that a student increase PA amounts for homework credit. We assessed the students' 3DPAR reports as complete or not complete for each week of the 3-week intervention and shared the results with the three PE teachers. The PE homework was not graded, because this study was not designed to modify the PE curriculum and grading policy of the schools involved nor to force any participants to complete the intervention to get a good grade.

We anticipated that the daily recording of PA using the 3DPAR self-report instrument would motivate those performing little PA to do more and those already doing considerable PA to maintain. To be included in the analysis, participants had to complete at least 2 weekdays and 1 weekend of 3DPAR, as suggested by Pate et al. (2003). Students submitted their completed 3DPAR every Monday during the intervention. All students in the three participating schools completed the 3DPAR during the intervention. However, only those who submitted the parental consent and youth assent forms were included in the final analyses.

Data Collection Procedure

Preintervention. After receiving permission from school personnel to conduct this study, we visited the schools to introduce the students to the importance of the study and administer the demographic questionnaire to the students in the selected PE classes. Then we collected PA baseline data using pedometers with an MVPA timer. During the pre- and posttest, trained members of the research team were present at all times during baseline PA data collection to ensure participants wore the pedometers correctly and to answer questions when needed.

During the intervention. After obtaining baseline PA data, we implemented the intervention for 3 weeks. The students received two educational sessions during the first three classes of the inter-

vention. Participants in this study completed the 3DPAR self-report instrument every day for the week including weekdays and weekends and returned it to their PE teachers every Monday during the intervention. We recorded the 3DPAR as complete or not complete and reported this information to the PE teachers on a weekly basis. PE teachers then shared the weekly results of the 3DPAR with their students and encouraged them to complete their 3DPAR. During the 3-week intervention program, at least one trained member of the research team was present at all times during each lesson to answer questions pertaining to the 3DPAR when needed.

Postintervention. After the 3-week intervention program, the students wore the same pedometers for 7 consecutive days, as was done preintervention. Trained members of the research team were present during postintervention PA data collection to ensure the participants wore the pedometers correctly and to answer questions when needed.

Data Analysis

We performed all statistical analyses using PASW Statistics (Version 18.0, Chicago, IL). We used an alpha level of 0.05 for all statistical analyses. The independent variable was completion of the 3DPAR homework or not, creating two groups (completers vs. noncompleters). The dependent variables included average steps per day and MVPA minutes per day for the whole week (7D), weekdays (5D), and weekends (2D). We calculated descriptive data as frequencies and reported them as percentages (see Table 1). Due to multicollinearity of the variables, we used a mixed-factor multivariate analysis of variance (MANOVA) to determine the effects of intervention participation on pre- versus postintervention PA (average steps per day and MVPA minutes per day) for 7D, 5D, and 2D. If we found a significant interaction, we used paired *t* tests (for pre- vs. postintervention in each group) and independent *t* tests (to compare the two groups pre- and postintervention) to decompose the interaction. We did not detect a sphericity violation ($\varepsilon = 1.000$).

Results

Table 1 presents the values for demographic and anthropometric data of the participants. Initially, 160 participants signed up for the study. Approximately 47.5% ($N = 76$) of the participants completed

all of the pedometer pre– and post–data collection and were used for the final study analyses. Of these 76 participants, 41 completed the homework intervention (completers; M_{age} = 13.2 ± 1.3 years) and 35 did not (noncompleters; M_{age} = 13.5 ± 1.8 years). Of the completers, 24 were boys (M_{weight} = 59.9 ± 12.9 kg, M_{height} = 162.3 ± 10.2 cm) and 17 were girls (M_{weight} = 61.0 ± 24.4 kg, M_{height} = 159.5 ± 10.3 cm). Of the noncompleters, 19 were boys (M_{weight} = 58.0 ± 21.9 kg, M_{height} = 161.2 ± 13.3 cm) and 16 were girls (M_{weight} = 74.6 ± 23.1 kg; M_{height} = 160.5 ± 7.1 cm).

Average Pedometer Step Counts per Day

Table 2 shows the average step counts per day and MVPA minutes per day for completers and noncompleters during pre- and postintervention. There were no significant interactions for 7D or 5D average steps per day ($p > 0.05$) and no significant main effects for 7D or 5D average steps per day ($p > 0.05$). However, there was a significant interaction (F = 4.595, p = 0.035, partial η^2 = 0.058) for 2D average steps per day. When running post hoc tests on this interaction, we found that the group that completed the intervention significantly improved (t = -3.24, p = 0.002, percent change = 39.34%) their average step count by 2,303 steps from pre- to postintervention on the weekends, whereas the group that did not complete the intervention did not have a significant difference in step counts on the weekends (t = -0.324, p = 0.748, percent change = 3.55%), improving their average step count by only 210.6 steps. There was no significant difference, however, between the groups for either pre- (85.5 steps/day difference, t = -0.106, p = 0.916, ES = 0.022) or postintervention (2,007.0 steps/day difference, t = 1.941, p = 0.056, ES = 0.483) in average steps per day on the weekends, although the postintervention difference had a moderate effect size. Based on the 7D pedometer step counts, approximately 14.6% (n = 6) of those who completed the intervention met the daily step recommendation of 12,000 steps (Colley et al., 2012) compared with only 8.6% (n = 3) of those who did not complete the intervention.

Table 2
Average Steps per Day and MVPA Minutes per Day Differences by Time and Completion of Intervention

	Preintervention (n = 76)		Postintervention (n = 76)	
Variable	Complete (n = 41) $M \pm SD$	Not complete (n = 35) $M \pm SD$	Complete (n = 41) $M \pm SD$	Not complete (n = 35) $M \pm SD$
5D steps/day	8812.5 ± 2821.9	8389.6 ± 2199.2	8763.4 ± 2949.7	8114.2 ± 2401.9
5D MVPA (min/day)	27.3 ± 12.3	24.8 ± 9.8	26.8 ± 12.5	24.5 ± 11.7
2D steps/day*	5853.7 ± 3055.9	5939.26 ± 3964.7	8156.8 ± 4761.7**	6149.8 ± 4155.1
2D MVPA (min/day)***	12.2 ± 9.7	13.0 ± 11.8	22.1 ± 19.0	16.1 ± 15.0
7D steps/day	8112.6 ± 2603.4	7848.3 ± 2328.3	8614.3 ± 2973.5	7570.4 ± 2340.4
7D MVPA (min/day)***	23.4 ± 11.3	22.2 ± 9.0	26.3 ± 12.0	23.8 ± 11.1

Note. MVPA = moderate to vigorous physical activity; 5D = weekdays; 2D = weekend days; 7D = all days of week.

*Significant interaction (p = 0.035).

**Significant difference pre- to postintervention in the group completing the intervention (p = 0.002).

***Significant main effect for time (pre- to postintervention is significantly different; $p < 0.001$ for 2D MVPA; p = 0.019 for 7D MVPA).

Average MVPA minutes per day. There were no significant interactions for 7D, 5D, or 2D ($p > 0.05$) average MVPA minutes. For 7D MVPA, there was a significant main effect ($F = 5.752$, $p = 0.019$, partial $\eta^2 = 0.072$) from pre- to postintervention with no main effect ($p > 0.05$) between groups; overall, the participants, regardless of completing the intervention, improved their MVPA from 22.8 to 25.0 min/day. For 5D MVPA, there was no significant main effect ($p > 0.05$). For 2D MVPA, there was a significant main effect ($F = 14.100$, $p < 0.001$, partial $\eta^2 = 0.160$) from pre- to postintervention with no main effect ($p > 0.05$) between groups; overall, the participants, regardless of completing the intervention, improved their MVPA minutes from 12.6 to 19.1 min/day on the weekends. Based on the 7D MVPA time, none of the participants met the recommended daily PA guidelines (i.e., 60 min/day of moderate intensity activity).

Discussion

The purpose of this study was to examine the effects of a 3DPAR intervention program on the PA levels of rural Appalachian school youth. To the best of our knowledge, this is the first study in which the pre- and postlevel of PA in rural Appalachian school youth has been assessed following a 3DPAR intervention program during which the 3DPAR instrument was utilized as PE homework. This study partially observed the effectiveness of a 3DPAR-delivered intervention to increase PA among rural Appalachian school youth. The intervention completers demonstrated significant step increases on weekends from an average of 5,853 to 8,156. Also, MVPA minutes per day increased on weekends from an average of 12.2 to 22.1 min/day for all participants. Regardless of whether participants completed the intervention, it should be mentioned that this is still far below recommendations of step counts per day and MVPA minutes per day. No further intervention effects of this study were observed. Approximately 14.6% of those who completed the intervention met the daily step recommendation of 12,000 steps compared to 8.6% of noncompleters at postintervention. The percentage of intervention completers meeting the daily step recommendation on weekends from pre- to posttest increased from 4.9% to 24.4%.

The results of this study partially support the hypothesis that intervention completers would demonstrate increased step counts

per day after the intervention. This partial intervention effect most likely had practical meaning even without statistical significance. An extra 2,000 steps is equal to walking 1 mile for most people; according to Hoeger, Bond, Ransdell, Shimon, and Merugu (2008), the average number of pedometer step counts to walk 1 mile ranges from 1,732 (men) to 2,371 (women) steps. If there is a 2,000 steps/day difference, that is almost equivalent to 1 extra mile of walking in a day for the intervention group of this study, which is approximately 16% of the daily step recommendation for youth (Colley et al., 2012).

Unfortunately, no previous intervention studies have been conducted to report the effectiveness of the 3DPAR instrument on school youth's PA levels. Lubans et al. (2009) incorporated interactive seminars on setting and monitoring PA goals into a pedometer-based intervention study for youth and reported significantly increased pedometer steps; boys and girls increased 1,000 and 2,000 steps/day, respectively. In the same study, participants attended seminars and were regularly provided feedback via e-mail messages during the intervention.

Studies using cognitive behavioral modification strategies appear to be important to promoting healthy and active lifestyles. The significant findings of this study are consistent with the findings in previous studies (Raedeke et al., 2010; Shimon & Petlichkoff, 2009). For instance, Simon and Petlichkoff (2009) reported that students who were able to monitor and report PA levels maintained their higher pedometer step counts during a 4-week intervention than those who were not. Participants in similar pedometer-based interventions with behavioral modification strategies also increased pedometer step counts (Croteau, 2004; Raedeke et al., 2010; Wyatt et al., 2004).

In contrast, Zizzi et al. (2006) found no intervention effects when using a quasi-experimental research design to assess pedometer step counts of high school students for 3 weeks. The high school student participants, who were randomly assigned to a goal setting or no goal setting group, did not increase pedometer step counts over the 3 weeks observed. Zizzi et al. reported that unexpected factors such as environmental barriers (e.g., unwalkable environment in rural areas and weather conditions) negatively affected their intervention study.

This study was designed based on the informational approach. This informational approach focuses on helping individuals under-

stand the cognitive behavioral skills perceived to precede health behavior (Kahn et al., 2002). Information provided to the participants in this study was primarily educational in nature and was provided to increase their knowledge of PA benefits, increase their awareness of available opportunities to be physically active within their community, explain methods for them to overcome perceived negative barriers to engage in PA, and increase their PA participation in community-based activities (Kahn et al., 2002). We cautiously conclude that observed pedometer step differences on weekends may be, in part, due to the use of the informational approach (Kahn et al., 2002) and use of a 3DPAR self-report instrument (homework) to which the participants were exposed during the intervention.

Observed step differences in this context could be also be attributed to physically active and motivated students who wanted to improve their baseline pedometer data after completing the intervention. Research evidence shows that the use of cognitive behavioral strategies to improve PA is positively associated with improved PA (Raedeke et al., 2010). Raedeke et al. (2010) reported that simply wearing a pedometer and keeping a log were not adequate to improve PA; however, when Raedeke et al. coupled this method with a cognitive behavioral skills training program, participants reported increased step counts.

Overall, the participants in this study demonstrated a low level of PA regardless of whether they completed the intervention. A possible explanation for this might be associated with environmental factors (e.g., unwalkable environment in rural areas and weather conditions), as reported by Zizzi et al. (2006). The low level of PA could be attributed to the time of year during which the study was conducted; data collection for two of the participating schools occurred during the winter months. However, in this study, it is not clear to what extent the intervention was effective. It was beyond the scope of this intervention to determine the factors relating to the increased pedometer step counts during weekends. Therefore, follow-up studies need to be conducted to confirm the findings of this study.

Regularly scheduled PE provides students with opportunities to learn motor and lifetime PA skills (IOM, 2013; USDHHS, 2008). Because more than 95% of American youth are enrolled in schools (NCES, 2001), physical educators should consider teaching stu-

dents to make informed decisions about their activity and lifestyles. Youth in low-income families were less likely to participate in organized sports because of, in part, financial matters (e.g., fees for participation and other equipment; Lutfiyya, Garcia, Dankwa, Young, & Lipsky, 2008; Snethen, Hewitt, & Petering, 2007). The region of Appalachia where the present intervention was conducted is economically disadvantaged (Oh & Rana, 2014); also refer to Table 1. For many of the rural Appalachian youth, school PE may be the only place where they learn motor and lifetime PA skills and participate in organized and supervised PA. Therefore, it is important that schools provide an adequate amount of PE time. According to a recent report, 44% of public school administrators in the United States have cut considerable time from PE and recess to increase core academic achievements responding to the No Child Left Behind mandate (IOM, 2013). PE should not be an option but central to the total school curriculum (Kelder, Karp, Scruggs, & Brown, 2014), because quality PE is foundational for lifelong health and learning active lifestyles (IOM, 2013). Unfortunately, where the present intervention was conducted only 23.3% of high school youth attend daily PE, which is lower than the national data of 31% (CDC, 2012). It has been reported that students in public schools could receive at least a minimum amount of daily MVPA if PE is a mandated part of the total school curriculum (IOM, 2013; Le Masurier & Corbin, 2006). Results from studies confirm that students are more likely to be physically active when PE is scheduled on a school day than when it is not (Brusseau & Kulinna, 2015; Morgan, Beighle, & Pangrazi, 2007). The findings of this study suggest that utilizing the 3DPAR self-report instrument, introduced during PE class, may be beneficial for students to make informed decisions about their active lifestyles outside of school.

This study has several limitations. The students who participated in this study were from one area and from three schools that were not randomly selected. This limits the generalizability of the findings of this study. Although the three participating schools represent rural Appalachian regions, a major limitation of this intervention study was a small sample of individuals from only one high school and two middle schools, which limited our ability to generalize the findings.

Although those who completed the intervention reported some increased step counts and MVPA time on weekends, students' participation rates in this study require some attention in future studies. Approximately 48% of our participants completed the intervention. Dropout occurred because of incomplete PA data collection, school absences, snow days, participants not completing proper forms, and the homework not affecting the final grade.

Despite the identified limitations of this study, it is unique to the current body of literature because no other researchers have attempted to promote student awareness and knowledge of current PA guidelines by using a valid 3DPAR self-report as PE homework. This 3-week pilot intervention study includes some practical applications, for instance, the use of an informational approach and an inexpensive 3DPAR self-report instrument to teach students about the importance of being physically active. The intervention was partially associated with an improved likelihood of increasing step counts and MVPA time. Although we used data from those who completed 2 weekdays and 1 weekend of 3DPAR as suggested by Pate et al. (2003), to minimize dropout rates during the intervention we encouraged students to complete as many days of 3DPAR as possible. In addition, we found that completing a 3DPAR was difficult for some students on a weekly basis during the intervention, suggesting that students will more likely obtain intervention effects if they are required to complete the 3DPAR self-report instrument as suggested by Pate et al. (2003), such as only 2 weekdays (Monday and Tuesday) and one weekend (Sunday). In addition, the effectiveness of a 3DPAR-delivered intervention to improve PA levels among rural Appalachian school youth could be determined by including a control group.

This study is unique, representing a collaboration with three local schools and one university in the region of Appalachia. The state board of education adopted the NASPE standards in 2007 and benchmarks and indicators in 2009 (Ohio Department of Education [ODE], n.d.). Since the 2012–2013 academic year, all schools in Ohio have been required to report student success in meeting the benchmarks contained in the Physical Education Academic Content Standards (ODE, 2015). All students in the three participating schools were included in the study, and except for a pedometer activ-

ity, students who did not submit the required forms for this study also received two educational sessions and completed a 3DPAR self-report instrument on a weekly basis as their PE homework. We then provided the PA data obtained from this study to the three PE teachers for report purposes to the ODE. We have successfully created new partnerships with local schools through the current intervention, which suggests that future studies could benefit from creating mutual ways to enhance the promotion of PA efforts among school youth, especially those living in rural areas.

In conclusion, we found that using a 3DPAR-delivered intervention over 3 weeks was partially associated with increasing step counts and MVPA time. A follow-up study with more participants is required to confirm the findings of this study. Specifically, factors relating to increased step counts and MVPA time on weekends need to be further studied with a mixed methods research design to obtain a better understanding of the extent of the effectiveness of the intervention. Future studies also need to evaluate whether a longer intervention including a control group could result in improving PA over the long term; for example, future studies should offer students incentives for completing the homework, to help them be more accountable.

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PEDAGOGY

Using the Personalized System of Instruction to Differentiate Instruction in Fitness

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Abstract

The purpose of this article is to provide an overview of how PE teachers can personalize learning to meet a variety of student needs. Differentiated instruction (DI) is a term frequently used in classroom-based learning to describe a method of personalization for individual students. The term can also describe a theoretical model for teaching and research, an instructional model, and a philosophy. Teachers must have a firm understanding of student readiness, interest, and learning profile to differentiate four areas of instruction: content, process, product, and the environment. Students in PE can benefit from DI, but there is a lack of formal methods to differentiate PE content. The Personalized System of Instruction (PSI) is an instructional model that provides a complete framework for PE teachers to personalize learning for all students. Fitness-related content such as resistance, plyometric, and agility training provides a context for applying the PSI model to DI in the secondary school setting.

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Differentiated instruction (DI) is a term used to describe a theoretical model for teaching and research, an instructional model, and a philosophy (Tomlinson & Imbeau, 2010). This type of instruction has primarily been applied to the classroom-based instruction, combining many common instructional strategies that focus on flexibility and personalization of learning (Tomlinson, 2014). Specifically, DI requires teachers to use their knowledge of student readiness, interest, and learning profile to differentiate four areas of instruction: content, process, product, and the environment (Santangelo & Tomlinson, 2012).

To gain this knowledge of students, teachers must adopt this philosophy and teach in a way to gain understanding of their students and how they learn. Student readiness includes not only a student's current skill level, but also a student's prior learning experiences, attitudes, and knowledge (Santangelo & Tomlinson, 2012). While striving to promote learning in the psychomotor, cognitive, and affective domains, physical education (PE) teachers must also consider students' prior learning in these domains. These prior experiences have also likely shaped student interest. In DI, the role of the teacher when selecting content is to grow and foster new student interests rather than consider current interests (Santangelo & Tomlinson, 2012). By providing students with developmentally appropriate instruction and opportunities for success, teachers can effectively grow student interest in a variety of content areas (Garn, Cothran, & Jenkins, 2011).

Teachers can further enhance instruction by differentiating according to a student's learning profile, which consists of four elements: learning style, intelligence preference, gender, and culture (Tomlinson et al., 2003). Learning style denotes a student's preferred context for learning, such as grouping methods, modes and presentation, and their interaction with the environment. Intelligence preference refers to a student's learning strengths (e.g., reading, singing, or reasoning), mode (e.g., touch, sing, work along, or with a group), and medium (e.g., sharing, working in nature, moving, or reflecting) within Gardner's (2011) eight areas of intelligence: visual-spatial, bodily-kinesthetic, musical, interpersonal, intrapersonal, verbal-linguistic, logical-mathematical, and naturalistic.

In PE, the implications of gender and culture must be carefully considered. Gender perceptions can negatively affect girls' partici-

pation in a variety of physical activity settings (Oliver & Hamzeh, 2010). PE teachers should consider these perceptions and use pedagogical practices that promote concepts such as gender equity and foster effective interpersonal relationships (Hills & Croston, 2012). Culture is also an important consideration because it can mediate differing preferences for activity and motivational patterns (Nishida & Isogai, 2007). PE teachers can use sport as a medium to foster cultural appreciation and mediate these activity preferences (Salter, 2003). However, many cultures have strong affinities toward specific sports, and indeed sport can play a large role in the larger culture of a society. Like gender, culture should be viewed as a personal characteristic of learning. Teachers who follow a philosophy of differentiation view gender and culture as small components that make each learner unique, and they take them into account when creating experiences that personalize learning.

Despite a strong understanding of students, teachers still find the task of personalizing content, processes, products, and the environment arduous. Each one of these four categories is interdependent, is interrelated, and overlaps each other (Tomlinson & Imbeau, 2010). The "content" is not changed in DI, but rather instruction is formatted in a way that students have multiple ways to access the content. "Process" is the activities or tasks students complete while developing and acquiring the knowledge, skills, and understanding. "Products" are the means by which students show the degree to which they have learned new content through diverse processes. The environment is the emotional and physical context where this occurs. Differentiation and personalizing one area, such as the content, may also affect the processes by which students interact with the content.

Implementing DI in PE provides teachers with many challenges with the diverse skills levels in a class and the limited time and space in the environment (Whipp, Taggart, & Jackson, 2014). Teachers have primarily applied DI in PE as an instructional strategy to meet the needs of students with disabilities (Lieberman & Houston-Wilson, 2009). However, many PE teachers possess the skills to differentiate. For example, teachers can modify the requirements of a task (i.e., process) using intratask variation (Graham, 2008). Despite possessing these pedagogical skills, teachers still struggle translating this into practice (Whipp et al., 2014).

These difficulties are perhaps the result of a clear lack of concrete examples of DI in the PE literature and models for DI in the PE setting. Instructional models provide PE teachers with a framework for DI and perhaps promote the transfer of DI into mainstream PE. Instructional models are a "plan or pattern that can be used to shape curriculums (long-term courses of studies), to design instructional materials, and to guide instruction in the classroom or other settings" (Joyce & Weil, 1980, p. 1). In PE, instructional models serve as a framework to guide teachers in planning, teaching, and assessing within an instructional unit (Metzler, 2011).

Because the primary goal of DI is personalization of content, the Personalized System of Instruction (PSI) is an instructional model that provides a framework with rich potential for differentiation. The PSI is an instructional model that was originally developed to personalize the process of learning in a large university psychology course (Keller, 1968). The PSI model has since been incorporated into PE with success (Prewitt et al., 2015a, 2015b; Pritchard, Penix, Colquitt, & McCollum, 2012). The PSI and DI focus on the individual nature of learning. When differentiating instruction, teachers must be guided by the following central tenets described by Tomlinson and Imbeau (2010): (a) Numerous individual differences make each learner unique, (b) all students learn differently and need different types of support to be successful, and (c) teachers should ensure that all students become proficient. The key features of the PSI clearly align with these tenets: (a) Student learning is self-paced, (b) student learning occurs in a mastery-based climate, (c) content is communicated to learners via written text, (d) "proctors" provide additional support and assess students on individual components of the course, and (e) lectures and demonstrations serve to increase student motivation rather than communicate course content (Keller, 1968; Keller & Sherman, 1974).

Recently, the PSI has primarily been implemented in the area of personal fitness such as the use of assessment to create and achieve personal fitness goals as students learn key concepts and skills (Colquitt, Pritchard, & McCollum, 2011; Prewitt et al., 2015b; Pritchard et al., 2012). The purpose of this article is to present a modification of the PSI to serve as a framework for DI. Specifically, teachers will use assessment to gain a better understanding of students with a focus on readiness, interest, and learning profile within

a PSI unit that differentiates content, process, and products within an environment that fosters personal learning. For our examples of implementing PSI as a framework for DI, the context will be a high school personal fitness unit.

Using the PSI to Differentiate Instruction in a High School Personal Fitness Unit

A primary challenge teachers face when implementing DI in PE is the diverse set of skills within a single classroom (Whipp et al., 2014). Personal fitness is a content area in which students are likely to have varying levels of skill, knowledge, and values. One third of the class likely possesses low levels of "proficiency" because they are overweight or obese (Ogden, Carroll, Kit, & Flegal, 2014). In terms of differentiation in personal fitness, the most challenging aspect is gaining understanding and differentiating according to student readiness. The self-pacing feature of the PSI can help teachers make this accommodation. Typically, a PSI workbook is created prior to the unit. The workbook places an emphasis on the written word, providing all instruction including management, tasks, and assessment. The advantage is the instructor is able to provide more feedback and increase meaningful instructional interactions because less time is spent demonstrating or lecturing. Each workbook contains modules that focus on the skills of the unit. The modules contain a written description of the skill, pictures, practice tasks, and a criterion task. Typically, the sequence progression of these modules or skills is developmentally appropriate. Students work at their own pace while they progress from one module to the next. Students read the information and practice the skill until they are able to complete the criterion task at a level that indicates "mastery."

When teachers are teaching fitness education using PSI, it is important that modules contain key concepts and skills that will enable students to change behavior and that will translate to positive changes outside the PE classroom (Colquitt et al., 2011). Because high school students are likely to have already mastered skills associated with cardiovascular exercise such as running, jogging, or cycling, the skills taught in the unit will primarily focus on new movement skills such as resistance training and plyometric and agility exercises when appropriate.

The levels of difficulty of resistance training exercises vary greatly, just as student fitness levels vary. This poses a challenge for those developing a PSI fitness workbook that is developmentally appropriate. The National Strength and Conditioning Association's (NSCA) classification scheme for resistance training status provides clear recommendations on the types of exercises that are appropriate based on current training program, training age, frequency, stress, and experience (see Table 1; Baechle & Earle, 2008).

Table 1
Classification of Resistance Training Status

Training status	Current program	Training age	Frequency (per week)	Training stress	Technique experience/ skill
Beginner (untrained)	Not training or just began training	< 2 months	≤ 1–2	None or low	None or minimal
Intermediate (moderately trained)	Currently training	2–6 months	≤ 2–3	Medium	Basic
Advanced (well trained)	Currently training	1+ years	3–4+	High	High

Gaining Understanding of Students Through Assessment

PE teachers can use assessment to determine a student's current level of readiness, which they would assess periodically prior to workbook assignment and after workbook completion. Based on assessment results, the teacher assigns a workbook to the student. In this manner, assessment serves the purpose of diagnostic assessment, which is appropriate for use when differentiating instruction for students (Tomlinson & Imbeau, 2010). The example assessment contains three distinct components and provides students with a PSI workbook in one of three tracks: beginner, intermediate, or advanced. One part of the assessment process is the use of the

aforementioned NSCA's classification scheme for resistance training status (see Table 1; Baechle & Earle, 2008). The teacher uses this to determine student readiness for resistance training. Although the primary purpose of the scheme is to provide guidelines for appropriate frequency and training stress based on the current program, training age, and skill level, it will serve as the first of three components of an assessment to evaluate readiness. Based on this scheme, a student must meet all criteria to progress from the beginner level. For example, a student who is currently training and has been training for 3 months would not be able to progress to the intermediate level until developing at least a basic level of technique experience.

The next section of the assessment contains fitness criteria from the Fitnessgram Healthy Fitness Zones (HFZ; see Table 2; Meredith & Welk, 2010). In the original PSI model, 90% was considered "mastery" (Keller, 1968) and 80% has been considered mastery when PSI has been implemented in PE (Colquitt et al., 2011; Pritchard et al., 2012). If a student meets the appropriate criteria to progress from a lower level based on resistance training status, the student then has to meet the criteria for the HFZ associated with each level. A student could progress from a beginner to intermediate workbook if currently training and having completed a training program of approximately two months at a low training stress and having developed a minimal level of technique experience. The goal for the student at the completion of the beginner workbook is not only to meet these criteria, but also to achieve a level of fitness within the HFZ in at least three fitness components. As students progress from the intermediate to advanced level, they would be required to meet criteria of advanced training status and to achieve scores within the HFZ in at least five areas. The inclusion of plyometrics and sport-specific training requires the application of additional criteria. The NSCA has specific criteria, including strength, speed, and balance, to evaluate the readiness of an individual to begin a plyometric training program (see Table 3; Baechle & Earle, 2008).

After determining student readiness, the teacher would then need to assess student interest and learning profile. Teachers can assess student interest in sport and PE through a less formal process. They can administer short surveys, ask questions, and engage in informal conversations with students to determine their interests.

Table 2
Health-Related Fitness Component Assessment

Fitness component	Fitness test	Healthy Fitness Zone (HFZ)	My score	Healthy Fitness Zone met (Y/N)
Body composition	Body Fat %			
	Body Mass Index			
Aerobic capacity	PACER			
	1-Mile Run			
	Walk Test			
Abdominal strength and endurance	Curl-Up			
Trunk extensor strength and flexibility	Trunk Lift			
Upper body strength and endurance	90° Push-Up			
	Modified Pull-Up			
	Flexed Arm Hang			
Flexibility	Shoulder Stretch			
	Back-Saver Sit and Reach			

Note. Beginner = 2 or less HFZ met; Intermediate = 3–4 HFZ met; Advanced = 5–6 HFZ met.

Teachers often gain such understanding through the instructional process. It is important that teachers remember that the purpose of gaining understanding of student interest is to connect new content to these interests and diversify student interest in various forms of physical activity and sport. Teachers can gain an understanding of the four elements of student learning profile through a combination of informal and formal assessment. Teachers can gain a firm understanding of student gender and cultural identity through observation and conversation. Dunn and Dunn (2014) provided examples of gaining understanding of student learning styles and

Table 3
Evaluation of Readiness for Advanced Conditioning and Sport-Specific Training

Component	Fitness test	Criteria	My score	Criteria met (Y/N)
Lower Body Strength	1RM Squat	1.5 × BW		
Upper Body Strength	1RM Bench	1.5 × BW (< 220 lb)		
		1 × BW (≥ 220 lb)		
	Clap Push-Ups	5 consecutive		
Lower Body Speed	Squat	5 reps with 60% BW in < 5 seconds		
Upper Body Speed	Bench Press	5 reps with 60% BW in < 5 seconds		
[a]Balance	Standing (Single Leg)	30 seconds without falling		

Note. BW = body weight.

[a]Additional balance tests may be required to advance within the plyometrics training module.

have since developed a website with online resources for assessment (http://www.learningstyles.net/). McKenzie (1999) developed resources to assess intelligence preference based on Gardner's (1983) theory (http://surfaquarium.com/MI/inventory.htm). In addition, Martin and Morris (2013) presented an overview of how to incorporate multiple intelligence theory into instructional models.

Differentiation of Content, Process, Products, and the Environment

After gaining a detailed understanding of the student through assessment, the teacher can use this knowledge and information to differentiate instruction according to the content, process, products, and the environment. The teacher completes differentiation by making

two modifications of the typical PSI course while maintaining the core elements of the model. First, the teacher incorporates flexibility into each module. Students must be able to choose which exercises to complete, how they practice and prepare for criterion tasks, and how to demonstrate mastery. Second, the teacher creates three separate workbooks, which are assigned based on the categories of training status and assessment results. The three levels of training status provide a basis from which to vary tasks and skills according to the readiness of the individual. In this manner, the teacher expands the typical PSI workbook to account for the different types and difficulty levels of fitness concepts and skills.

The beginner workbook focuses on rudimentary fitness concepts and fosters the development of basic fitness skills such as balance, flexibility, aerobic capacity, and muscular strength and endurance. The modules within this workbook require mastery of basic bodyweight exercises and the use of selectorized equipment (see Module Examples section, Push-Up). The intermediate workbook focuses on skills that require more coordination and strength and place a greater training stress on the body. This workbook contains skills and concepts such as free weight exercises and concepts that are more advanced such as cardiovascular endurance (see Module Examples section, Bench Press). The advanced workbook is for students with a sound conditioning base and a high level of skill and experience (see Module Examples section, Power Clean). This course focuses on more advanced fitness concepts such as sport-specific training, power training, functional anatomy, speed/agility, and plyometrics. Many free and reputable online resources are available for teachers to use to create modules for these content areas (see www.exrx.net).

Distinctions between these levels of readiness are important because many high school PE programs offer courses based on prerequisites and course sequencing. For example, students could take Personal Fitness, Introductory Weight Training, and Advanced Weight Training in three consecutive terms. As in other PE courses, students enter each of these with significant variations in readiness. The final module in each workbook focuses on the development and completion of a personal fitness program, the length of which is determined by the level and the focus of which is based on individual goals based on assessment prior to workbook assignment.

The selection of exercises and the scope and sequence of the modules provides flexibility for the student and the teacher. The teacher can select content to include in a workbook based on the equipment available or allow students to choose which modules to complete in each section of the workbook. The key for teachers to differentiate instruction successfully is first seeking to understand students through assessment. The teacher must accomplish this prior to developing PSI workbooks. Because of the nature of instruction in the PSI, this understanding allows the teacher to fulfill many requirements of DI prior to the first class in the fitness unit through the creation of workbooks. During class, the teacher can take advantage of the benefits of PSI instruction such as reduced lecture time and increased individual feedback to differentiate content, process, products, and the environment.

The instructional format of the PSI allows teachers to differentiate the content, the "content" being the methods students use to access key fitness concepts and skills. Table 4 presents examples of differentiation options, many of which have been modified from Tomlinson and Imbeau (2010) and specifically for the PSI in fitness. It is important to consider that in DI "there are instances, however, when some students need to go back to prerequisite content in order to move ahead, when advanced learners need to move ahead before their classmates are ready to do so . . ." (Tomlinson & Imbeau, 2010, p. 15). The workbook provides this opportunity, allowing the teacher to emphasize the written word and to use lectures and verbal instructions to motivate rather than convey content (Keller & Sherman, 1974). The workbook also allows the teacher to provide feedback and instruction to students who need it most. An increase in teacher–student interactions also means that teachers spend more time making fitness content relevant to students by connecting the content to their interests. Teachers can provide examples of how variations of exercises can be performed outside the school setting or how the exercise relates to sports or similar activities. They can further differentiate content by using technology to expand the various modes in which the "written" word is communicated. A teacher could set up a laptop for students to access free online video demonstrations of exercises (e.g., see www.exrx.net). Different types of readiness drills and practice tasks also ensure that students have multiple ways to engage content.

Table 4
Examples of Differentiation Options Within the PSI

Area of instruction	Readiness	Interest	Learning profile
Content	Pictures, videos, and active demonstration Small group instruction Partner/proctor checks Emphasis on the written word	Teacher interactions based on student interests Scaffolding of modules Application of fitness components to sport and other physical activity settings	Varied modes of "written" word (video, audio, and written) Multiple practice tasks and readiness drills
Process	Tasks of varied levels of difficulty Independent practice and progression Self-pacing Mastery-based learning	Use of technology to assist in workbook completion Supplementary activities based on student interest Students serving as experts (proctors)	Choice of interactions (i.e., partner or individually) Intratask variations for practice tasks based on learning preference
Product	Personal goal setting based on assessment results Personal fitness plan based on personal goals	Inclusion of interests in personal goals and fitness plan Flexible selection of exercises to complete within modules	Varied presentations of personal goals and workout plan Complex and varied criterion tasks

Table 4 (cont.)

Area of instruction	Readiness	Interest	Learning profile
Environment	Partner checks/ tasks with a focus on collegiality Varied equipment options Individual feedback based on student needs	Individual feedback based on student interest Varied options for individual versus group interactions Student choice of exercises and equipment	Optional modes of student–student and teacher–student interactions Flexible modes of dress for various fitness activities

The process is also differentiated by the creation of three workbooks. Students follow a predetermined, developmentally appropriate progression based on their current level of readiness. Students also have the option to work with a partner or independently while they complete modules. The presence of criterion tasks also ensures that students have mastered key content before proceeding to the next module. The use of technology also provides opportunities for differentiation of the process by student interest. Students could create an online fitness portfolio using Google Sites, uploading pictures and videos of themselves completing their favorite exercises to demonstrate competence. The teacher can also provide supplementary activities based on student interest. The teacher can include this in the workbook or as an activity outside the normal class structure. For supplementary activities, the teacher could require students to connect or relate fitness content to other physical activity or sport preferences. The nature of the PSI model also presents options for the teacher to differentiate the process according to the learning profile of each student. Students with either interpersonal or intrapersonal preferences can choose to work with a partner or independently. Teachers can also provide variations on practice tasks and readiness drills that personalize these tasks based on learning style and intelligence preference.

Products are perhaps the most personalized element of DI because students create personal goals based on their personal fitness assessment results. Because students are creating their own goals, the teacher should provide guidance while ensuring students select goals that reflect their current level of readiness and interests. Students learn the skills and concepts based on their current status and then complete a personal fitness plan to meet those goals. Student progress while completing the workbook. Students can develop and complete a personal fitness plan with flexibility, working in a way that reflects their learning style and intelligence preferences. The teacher also has many options regarding presenting and tracking the goals and workout plan. The teacher can provide students with multiple ways of presenting and creating their workout plans to differentiate products and ensure they have achieved mastery.

Creating flexible workbooks within the PSI creates an environment that fosters differentiation. An emphasis on the written word and partner checks presents students with options regarding student-to-teacher and student-to-student interactions. The environment is built around the personal nature and progress of student learning. In the PSI, students "progress as fast as they can or as slowly as they need" (Metzler, 2011). Students who need increased support and instruction from the teacher can have this need met because the teacher is functioning as a facilitator for the entire lesson while providing high rates of quality feedback.

Module Examples

PSI Module for Push-Ups

The Push-Up is an exercise for the chest muscles. It is important to work these muscles for many activities in which you may participate throughout your life. Be familiar with the following muscles (Figure 1) and cues (Table 5) when performing the Push-Up.

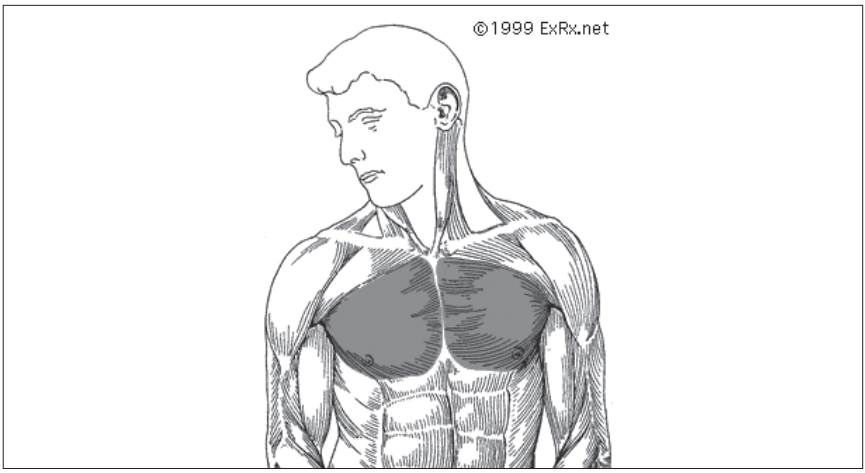

Figure 1. Pectoralis major: Sternal head. Image used with permission of ExRx.net.

Table 5
Push-Up Technique and Performance Cues Checklist

Performance cues	Picture
☐ 1. Lie prone on floor with hands slightly wider than shoulder width. ☐ 2. Raise body up off floor by extending arms with body straight.	
☐ 3. Keeping body straight, lower body to floor by bending arms.	
☐ 4. Push body up until arms are extended. ☐ 5. Repeat.	

Comprehension task/readiness drill. Find a partner and demonstrate to each other the proper performance cues for the Push-Up with only your body weight. Be able to identify the muscles being activated during this exercise. Be sure to provide feedback to each other for correct and incorrect (Table 6) performance cues until both of you can correctly execute the Push-Up. Perform Push-Up using proper form for at least 5 repetitions.

Learning tips.

- Breathe out during the Upward Phase and breathe in on the Downward Phase.

If you experience difficulty with this readiness drill, refer to the Performance Cues and review each cue as presented. If you still have difficulty, ask your course instructor to assist you in applying these techniques.

Table 6

Common Errors and Corrections

Error	Correction
Your back is not straight.	Concentrate on keeping core muscles contracted.
You are not bending elbows enough for correct push-up.	Elbows should be at a 90° angle at the down position. May need to have hands wider at the starting position.

Criterion task for push-up. Get with a partner and have your partner check off the criteria that you performed correctly for the Push-Up.

Criterion task 1.

Partner Checked

1. Target: Correct form
2. Criterion: Score 5 out of 5 on the Push-Up Technique and Performance Cues Checklist

Perform the Push-Up with correct form while a partner checks your **Push-Up Technique and Performance Cues Checklist** (Table 5). You must score 5 out of 5 on the Push-Up Technique and Performance Cues Checklist to go to the next task. Write down your score for each set (Table 7). Note that we are concerned with correct form!

Table 7
Personal Recording Form

Set	1	2	3	4	5
Push-Up Checklist Score					

Partner initials _____ Date completed _____

Criterion task 2.

Partner Checked

1. Target: Correct form
2. Criterion: Complete as many Push-Ups consecutively with correct form

Perform the Push-Up as many times possible with CORRECT form for three sets. Write down the number of Push-Ups you completed in each set (Table 8). You may rest 2 to 3 minutes between sets.

Table 8
Personal Recording Form

Set	1	2	3
Repetitions			

Partner initials _____ Date completed _____

Once you have completed as many Push-Ups consecutively with correct form, write the exercise performed along with the total number repetitions for all three sets on your Exercise Checklist.

PSI Module for Bench Press

The Bench Press is an exercise for the chest muscles. Be familiar with the following muscles (Figure 2) and cues (Table 9) when performing the Bench Press.

Facts to know . . .

- A wider grip focuses mainly on the chest muscles and a narrow grip adds more shoulder muscles.
- If you are just getting started estimating how much you should lift, it is recommended that you start with 60% of your body weight.

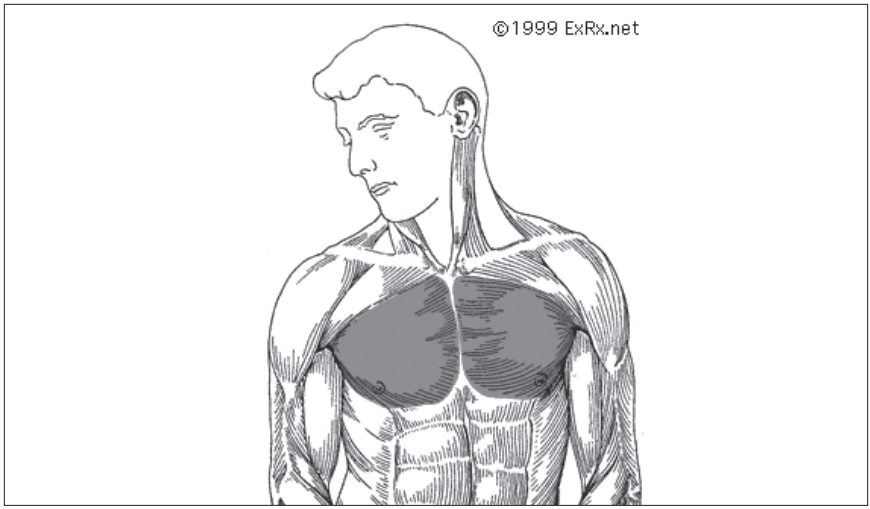

Figure 2. Pectoralis major: Sternal head. Image used with permission of ExRx.net.

Table 9
Bench Press Performance Cues Checklist

Performance cues	Picture
☐ 1. Lie on bench using 5-point body contact position. ☐ a. Back of the head on bench ☐ b. Upper back/shoulders on bench ☐ c. Lower back/buttocks on bench ☐ d. Right foot on floor ☐ e. Left foot on floor ☐ 2. Dismount barbell from rack over upper chest using wide pronated grip or common pronated grip.	

Table 9 (cont.)

Performance cues	Picture
☐ 3. Lower weight to upper chest.	
☐ 4. Press bar until arms are extended.	
☐ 5. Repeat until you have completed the correct number of repetitions and then rack the bar.	

Comprehension task/readiness drill. Get into a group of three and demonstrate to each other the proper performance cues for the Bench Press with very little weight. You will have a performer, a spotter, and a recorder. Be able to identify the muscles being acti-

vated during this exercise. Be sure to provide feedback to each other for correct and incorrect (Table 10) performance cues until all three correctly execute the Bench Press. Perform the Bench Press using proper form with a weight you can lift at least 10 repetitions.

Learning tips.

- Make sure you breathe out during the Upward Phase and breathe in on the Downward Phase.
- Do not lock out your elbows on full extension.
- Control the weight during the lift so you have a smooth motion.

If you experience difficulty with this readiness drill, refer to the Performance Cues (Table 9) and review each cue as presented. If you still have difficulty, ask your course instructor to assist you in applying these techniques.

Table 10

Common Errors and Corrections

Error	Correction
You cannot control the weight.	• Choose a weight that you can not only lift but also control. • Make sure the weight is moving slowly.
Your grip is not evenly spaced.	• Adjust the hands so they are equal distance from the plates. • After the weight is lowered, your wrists should be directly over your elbows.
Your elbows extend unevenly.	• Concentrate on the arm that lags behind. • Choose an object straight ahead to focus on instead of looking at your arms.
Your back and/or buttocks lifts off the pad.	• Lighten the load. • Concentrate on keeping your back and buttocks against the bench or pad.

Criterion task 1.
Partner Checked

1. Target: Correct form
2. Criterion: Score 5 out of 5 on the Bench Press Performance Cues Checklist

Get into a group of three. Perform the Bench Press with a weight that you think you can lift with correct form while a partner checks your **Bench Press Performance Cues Checklist** (Table 9). The third person will be a spotter. You must score 5 out of 5 on the Bench Press Performance Cues Checklist to go to the next task. Write down your the weight lifted and your score for each set (Table 11). Note that you are not concerned with weight but with correct form! Spotters, make sure you do your job correctly.

Table 11
Personal Recording Form

Set	1	2	3	4	5
Weight					
Bench Press Checklist Score					

Partner initials _____ Date completed _____

Criterion task 2.
Partner checked

1. Target: Correct form
2. Criterion: Lift as much weight as possible for 10 repetitions

Perform the Bench Press with a weight that you think you can lift at least 10 repetitions. If you are unable to lift the weight 10 repetitions, then you have too much weight. Let your partners go and then try again after approximately 1.5 to 2 minutes of rest. If you are able to lift 10 repetitions with ease, then the weight is not heavy

enough. Let your partners go and then add some weight during your turn after your rest period. Keep doing this until you have reached a weight that you can lift at least 10 repetitions with CORRECT form. Write down the weight lifted and number of repetitions for each set (Table 12). *Note:* You may not do 9 sets.

Table 12
Personal Recording Form

Set	1	2	3	4	5	6	7	8	9
Weight									
Repetitions									

Partner initials _____ Date completed _____

Criterion task 3.
Partner Checked

1. Target: Calculate 1RM
2. Criterion: Determine 1RM of Bench Press

To calculate your 1RM, take the maximum amount you lifted 10 RM and divide it by 75%. Your answer should rounded up or down based on 5 lb. Calculate your 1RM. Have your partner check off the criteria that you performed correctly for the Bench Press.

PSI Module for Power Clean

The Power Clean is a power exercise for multiple muscles. It is important to work these muscles for many activities in which you may participate throughout your life.

Be familiar with the following muscles (Figures 3 to 8) and cues (Table 13) when performing the Power Clean.

Facts to know. . .

- There is NO Spotter for this exercise.

Figure 3. Gluteus maximus. Back view of leg. Image used with permission of ExRx.net.

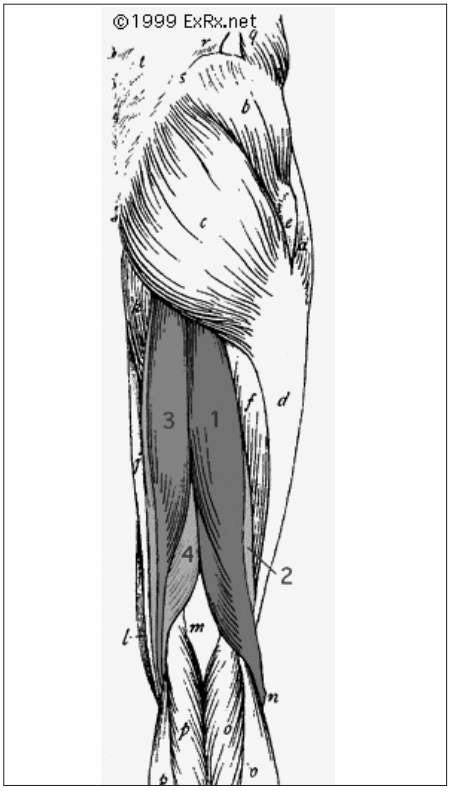

Figure 4. Hamstrings: (1) Biceps femoris, long head; (2) biceps femoris, short head; (3) semitendinosus; (4) semimembranosus. Back view of leg. Image used with permission of ExRx.net.

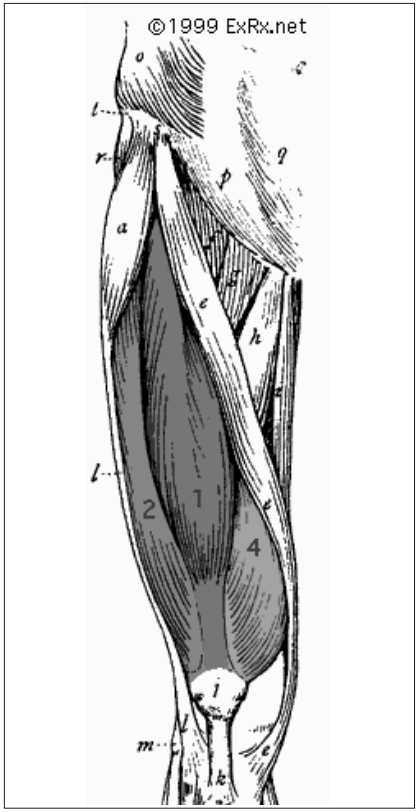

Figure 5. Quadriceps: (1) Rectus femoris, (2) vastus lateralis (externus), (3) vastus intermedius, (5) vastus medialis (internus). Front view of leg. Image used with permission of ExRx.net.

Figure 6. Gastrocnemius: (1) Medial head, (2) lateral head. Image used with permission of ExRx.net.

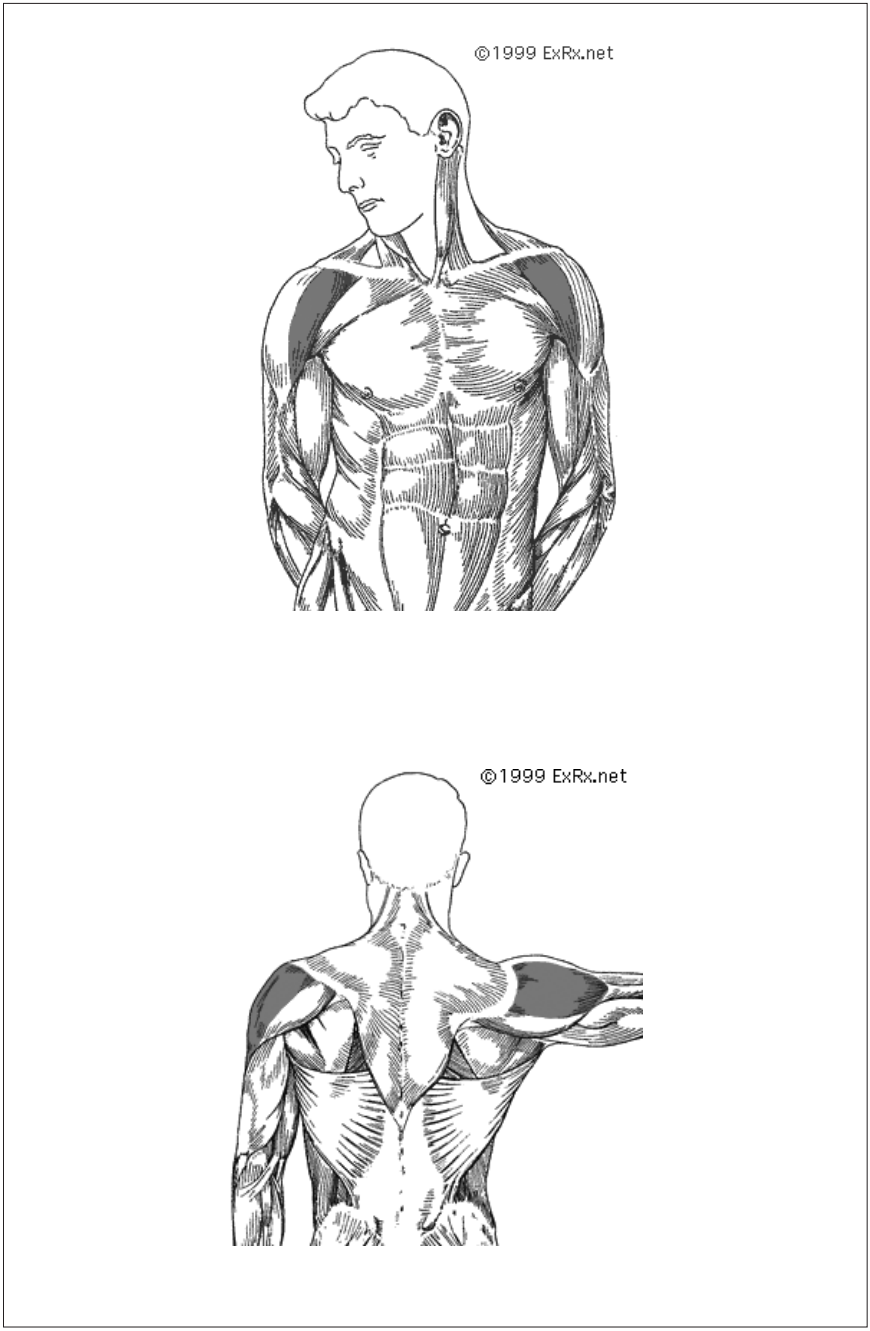

Figure 7. Deltoids: Anterior deltoid (top), lateral deltoid (bottom). Images used with permission of ExRx.net.

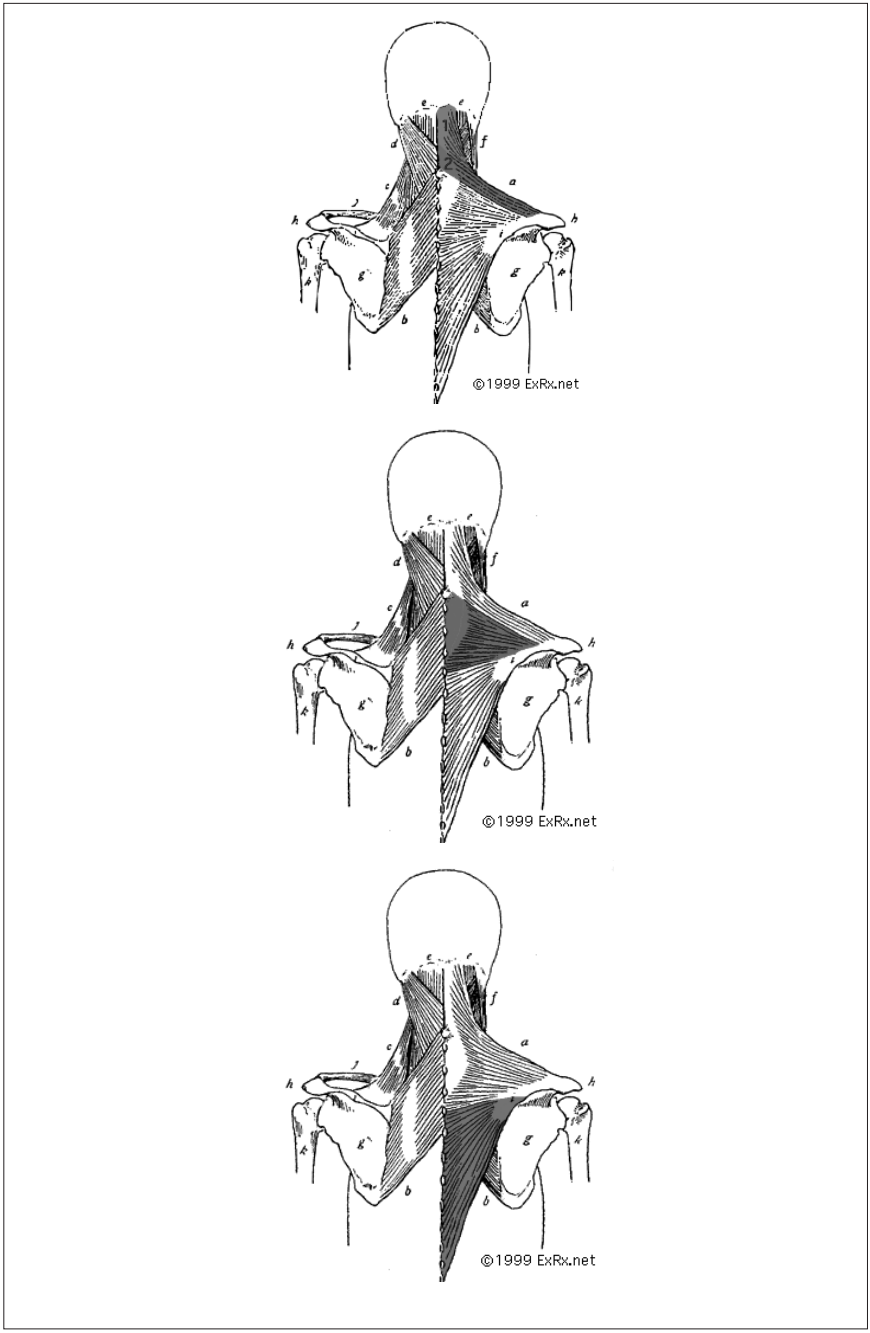

Figure 8. Trapezius: Upper fibers part 1, upper fibers part 2 (top); middle fibers (middle); lower fibers (bottom). Images used with permission of ExRx.net.

Table 13
Power Clean Technique and Performance Cues Checklist

Cues	Picture
☐ 1. Stand over barbell with balls of feet positioned under bar pointing forward, hip-width apart or slightly wider. ☐ 2. Squat down and grip bar with overhand grip slightly wider than shoulder width. ☐ 3. Position shoulders over bar with back arched tightly. Arms are straight with elbows pointed along bar.	
☐ 4. Pull bar up off floor by hips and knees.	
☐ 5. As bar reaches knees, vigorously raise shoulders while keeping barbell close to thighs. When barbell passes thigh, allow it to contact thighs. ☐ 6. Shrug shoulders and pull barbell upward with arms allowing elbows to flex out to sides, keeping bar close to body.	

Table 13 (cont.)

Cues	Picture
☐ 7. Aggressively pull body under bar, rotating elbows around bar.	
8. Catch bar on shoulders while moving into squat position.	
9. After squat position, extend knees and hips to stand.	

Comprehension task/readiness drill. Find a partner and demonstrate to each other the proper performance cues for the Power Clean with very little weight. Be able to identify the muscles being activated during this exercise. Be sure to provide feedback to each other for correct and incorrect performance cues until both of you correctly execute a Power Clean. Perform a Power Clean using proper form with a weight you can lift at least 5 repetitions.

Learning tips.

- Breathe out during the Upward Phase and breathe in on the Downward Phase.
- Control the weight during the lift so you have a smooth motion.

If you experience difficulty with this readiness drill, refer to the Performance Cues and review each cue as presented (see Table 14 for common errors and corrections). If you still have difficulty, ask your course instructor to assist you in applying these techniques.

Table 14
Common Errors and Corrections

Error	Correction
Not using momentum	To do a proper Power Clean, apply upward force to the bar and then drop your body down underneath it.
Not flicking the wrist	It helps get the weight "around the corner" so that you can rack it on your shoulders.
Not dropping the body down as you rack the bar on your shoulders	Your legs should not remain stiff and stationary throughout the movement. As you flip the bar up and across your shoulders, bend your knees quickly and drop down when catching the bar.

Criterion task 1.
Partner Checked

- Target: Correct form
- Criterion: Score 9 out of 9 on the Power Clean Technique and Performance Cues Checklist

Perform the Power Clean with a weight that you think you can lift with correct form while a partner checks your **Power Clean Technique and Performance Cues Checklist** (Table 13). You must score 9 out of 9 on Power Clean Technique and Performance Cues Checklist to go to the next task. Write down weight lifted and score for each set (Table 15). Note that you are not concerned with weight but with correct form!

Table 15
Personal Recording Form

Set	1	2	3	4	5
Weight					
Power Clean Checklist Score					

Partner initials _____ Date completed _____

Criterion task 2.
Partner checked

- Target: Correct form
- Criterion: Lift as much weight as possible for 5 repetitions

Perform the Power Clean with a weight that you think you can lift at least 5 repetitions. If you are unable to lift the weight 5 repetitions, then you have too much weight. Let your partner go and then try again after approximately 2 to 5 minutes of rest. If you are able to lift 5 repetitions with ease, then the weight is not heavy enough. Let your partner go and then add some weight during your turn after your rest period. Keep doing this until you have reached a weight that you can lift at least 5 repetitions with CORRECT form. Write down weight lifted and number of repetitions for each set (Table 16). *Note:* You may not do 9 Sets.

Table 16
Personal Recording Form

Set	1	2	3	4	5	6	7	8	9
Weight									
Repetitions									

Partner initials _____ Date completed _____

Criterion task 3.
Partner Checked

- Target: Calculate 1RM
- Criterion: Determine 1RM of Power Clean

To calculate your 1RM, take the maximum amount you lifted 10 RM and divide it by 75%. Round up or down your answer based on 5 lb. Calculate your 1 RM. Have your partner check off the criteria that you performed correctly for the Power Clean.

Conclusion

Students in secondary PE settings have an increasingly diverse set of skills and experiences. The teacher must differentiate instruction to meet the needs of all students and provide developmentally appropriate experiences. The PSI instructional model provides a coherent framework for PE teachers to differentiate instruction. Although the teacher requires additional time to plan a PSI, current technology-related resources make implementation feasible and practical with the teacher spending less time in instruction, management, and assessment.

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PHYSICAL ACTIVITY V. PHYSICAL EDUCATION

The Relationship Between Secondary School Physical Education and Postsecondary Physical Activity

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Abstract

Background: *Throughout secondary school in Ontario, PE is offered with the goal of students developing "the skills and knowledge they require to participate in physical activities throughout their lives" (Ontario Ministry of Education 1999a, p. 2). Despite the curricular goals of PE, little research has been conducted on the effects of PE on PA after secondary school completion.* ***Purpose:*** *The purpose of this study was to examine the relationship between previous secondary school PE and current PA of postsecondary students.* ***Method:*** *A convenience sample of 112 participants was recruited to complete an online survey about current PA behaviors and past enrollment in secondary PE (amount and type). A subsample of participants agreed to wear a pedometer to monitor their PA behavior objectively. We used t tests to analyze the relationship between current PA and previous enrollment in secondary PE in volume and in regard to specific course enrollment.* ***Results:*** *We found no significant relationship between total number of PE classes taken during secondary school and PA participation as an emerging adult. We found some significant differences in PA participation between those who took specific types of PE courses compared to those who took a single mandatory course.* ***Conclusion:*** *The results suggest that content as opposed to volume of PE courses is related to increased PA after secondary school completion. Future studies should seek to examine the content of specific PE courses and the effect of course content related to transition stages such as emerging adulthood.*

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Only a small percentage of Canadian adults attain the physical activity (PA) recommendations of 150 min/week of moderate to vigorous activity (Colley et al., 2011a). Activity levels are equally poor for Canadian youth (Colley et al., 2011b) and youth in other countries (e.g., Hallal et al., 2012). Physical education (PE) is one way in which PA may be enhanced for youth (e.g., Sallis & McKenzie, 1991; Sallis et al., 2012). Discussions pertaining to the effects of PE have extended from the immediate benefit for students to the longer term adult implications, specifically the notion of "lifelong activity participation" (e.g., Kirk, 2005; Penney & Jess, 2004; Sallis & McKenzie, 1991; Sallis et al., 2012). In considering the goal of ". . . a lifetime of physical activity," Sallis et al. (2012) suggested that "this goal . . . is difficult to evaluate and has limited evidence to support its validity (Trudeau, Laurencelle, Tremblay, Rajic, & Shephard, 1999)" (p. 126).

The "limited evidence" used by Sallis et al. (2012) is the well-known Trois-Rivières study, which showed that only women who had PE for 5 hr/week during elementary school were more physically active as adults versus a control group (Trudeau, Laurencelle, Tremblay, Rajic, & Shephard, 1999). Additional evidence linking PE specifically to adult PA can be garnered from research with emerging adults. Arnett (2000, 2005, 2006, 2007) proposed the term *emerging adulthood* to describe the period of life that postsecondary students in developed countries experience. This life stage falls between adolescence and adulthood and ends when individuals begin to take on adult roles such as marriage, parenthood, or a stable career (Arnett, 2000). For PA levels across the life span, Telama's (2009) review offers evidence for PA tracking.

During transition times, such as entry into postsecondary education, PA levels are affected (Allender, Hutchinson, & Foster, 2008; Kimball, Jenkins, & Wallhead, 2009). In a sample of first year university students, Bray and Born (2004) assessed the level of vigorous PA from the end of high school compared to the beginning of university. They found that students could be classified as "continuously active" from high school to university (33.1%), "continuously insufficiently active" (22.8%) during this time, with the remaining either increasing or decreasing activity from the end of high school to the start of university (p. 184). Butler, Black, Blue, and Gretebeck (2004) followed a group of freshman female students from their entry into

college until 5 months later and found that total PA, work activities, and sport activities decreased.

In addition to observing reductions in certain types of PA from the mid-teens until the late 20s, Zick, Smith, Brown, Fan, and Kowaleski-Jones (2007) identified being "in school" as a factor affecting activity levels (differently) for males and females, although the interaction with age was not reported (thus not indicating if school meant secondary school or postsecondary schooling). More recently, Kwan, Cairney, Faulkner, and Pullenayegum (2012) followed a nationally representative sample of Canadian adolescents for 12 years (starting from ages 12 to 15) and observed a decline in PA during that period. Distinguishing the sample by gender and whether participants had undertaken postsecondary education, they found that the decrease in PA was most noticeable for men entering postsecondary education (Kwan et al., 2012).

Sallis and McKenzie cited evidence from the mid-1980s and identified declines in activity as an issue in 1991, following with a suggestion that "high school and college physical educators may have the best opportunity to prepare students to maintain patterns of regular physical activity" (p. 134). In addition, researchers have examined the link between secondary school PE and PA levels among postsecondary students. When Texas college students were surveyed, those who had not taken PE in high school (compared to those who did) were more active as college students (Everhart et al., 2005). Using the Lifelong Physical Activity framework, Kimball et al. (2009) investigated "university students' perceptions of the influence of high school PE programs on their current level and modality of PA" (p. 252). The participants were taking an activity course at university. The only link between total PA at the time of the study and past experience in PE was for females, whereby ". . . respondents suggested that their current level of PA was influenced by how little they learned during the high school PE experience and the lack of comfort they perceived in performing PA . . ." (p. 263). In another study with university students taking an elective PA course, researchers found that many participants reported past PE success and a positive experience in PE (Hildebrand & Johnson, 2001).

In Ontario, secondary school students are required to complete 1 PE credit to receive an Ontario Secondary School Diploma

(Ontario Ministry of Education, 1999a, 2015). It is clear from previous research that in Ontario as grade levels increase, student enrollment in PE decreases (Allison & Adlaf, 2000; Dwyer et al., 2006; Hobin, Leatherdale, Manske, Burkhalter, & Woodruff, 2010). Specifically, Hobin et al. (2010) found that enrollment in PE dropped from 73.4% in Grade 9 to 51.3% in Grade 12 in a large study of Ontario secondary schools.

At the time of this study, the secondary curriculum in Ontario also espoused the concept of lifelong participation according to the Ontario Ministry of Education (1999a), which designed

> the health and physical education curriculum . . . to provide learning experiences that will help students realize their potential in life. Students will develop . . . the skills and knowledge they require to participate in physical activities throughout their lives. (p. 2)

A new curriculum was introduced in 2015 in Ontario, which includes similar goals; two of the four expectations include that "students will develop . . . the skills and knowledge that will enable them to enjoy being active and healthy throughout their lives . . . [and] a sense of personal responsibility for lifelong health . . ." (Ontario Ministry of Education, 2015, p. 6). Given the opportunity for learning the skills for lifelong PA through such courses, students may be missing the opportunity (if not enrolled) to gain valuable skills to allow them to overcome the decrease in PA associated with the transition from secondary school to university.

In keeping with Sallis et al. (2012), Trudeau and Shephard (2005) suggested that more research is needed to determine if and to what extent PE influences PA over the life span. Although there has been research on PA declines in the postsecondary years (e.g., Kwan et al., 2012) and a link between current PA and perceived PE experiences (e.g., Kimball et al., 2009), currently there is a lack of research examining the relationship between amount or type of PE taken in secondary school and postgraduate levels of PA. As such, the purpose of this study was to determine if a relationship exists between

the amount and type of PE taken during secondary school and the PA level of emerging adults who pursue postsecondary education in Ontario.

Method

Recruitment

After receiving research ethics board approval from two Ontario postsecondary institutions (one college and one university), we recruited participants through the postsecondary institution in which they were enrolled using a variety of tools including attending lectures (28 in-class announcements on the college campus and 54 on the university campus to explain the study and leave a card with a website link to the study and with contact information for the primary researcher) with prospective participants in attendance and posting posters and leaving information cards on the university campus. We directed interested participants to an online questionnaire. Participants provided informed consent prior to completing the survey.

Participants

To be included in the study, individuals had to have attended an Ontario high school and be between the ages of 18 and 25. Given this age range and the time of the study, all participants would have been exposed to the 1999 version of the Ontario Health and Physical Education curriculum during secondary school. A convenience sample of 112 eligible participants who completed a questionnaire was obtained, of which 94 were enrolled at a university and 17 were enrolled at a college and one participant had missing data on this variable. This participant was kept in the Total Sample for all variables except Current Postsecondary Program (see tables below) but not in the split of university or college students. The average age of the sample was 20.22 years (SD = 1.78) with 78 being female and 34 being male. For further demographic information, see Table 1.

Table 1
Participant Descriptives

Demographic information	Total sample *n* (%)	University students *n* (%)	College students *n* (%)
Sample	112 (100)	94 (83.93)	17 (15.18)
Gender			
Male	34 (30.36)	27 (28.72)	7 (41.18)
Female	78 (69.64)	67 (71.28)	10 (58.82)
Age			
18	19 (16.96)	15 (15.96)	4 (23.53)
19	28 (25.00)	26 (27.66)	2 (11.76)
20	20 (17.86)	16 (17.02)	4 (23.53)
21	20 (17.86)	19 (20.21)	1 (5.88)
22	11 (9.82)	7 (7.46)	4 (23.53)
23	8 (7.14)	6 (6.38)	2 (11.76)
24	4 (3.57)	3 (3.19)	0
25	2 (1.78)	2 (2.13)	0
BMI			
Underweight	5 (4.46)	4 (4.25)	1 (5.88)
Normal weight	80 (71.43)	68 (72.34)	11 (64.71)
Overweight	24 (21.43)	20 (21.28)	4 (23.53)
Obese	3 (2.68)	2 (2.13)	1 (5.88)
Current Postsecondary Program			
Health-related	37 (33.04)	26 (27.7)	11 (64.71)
Non-health-related	74 (66.07)	68 (72.3)	6 (35.29)

Data Collection

The online questionnaire included six sections. The section containing demographic and schooling PE background questions such as gender, age, height, weight, current postsecondary context (e.g., current type of residence, program of study), and secondary school information (e.g., location, the PE courses taken during high school [from a provided list], sport team participation) was relevant to this research.

The second section included the short form of the International Physical Activity Questionnaire (IPAQ; Craig et al., 2003). The short form IPAQ is a seven-question, self-report instrument of current PA level (*International Physical Activity Questionnaire,* 2002). In this section, the IPAQ poses questions about the participants' past 7 days and allows participants to provide information about their current PA at moderate and vigorous levels and their walking behavior, allowing for a weekly MET-minute score. We made two modifications to the questionnaire. For questions asking the number of hours and minutes per day, we added a sample answer of 1 hr (under hours per day) and 30 min (under minutes per day) to avoid confusion. Also, to minimize errors in responses, we replaced standard blank lines for responses in a scroll down menu to avoid responses of greater than 59 min or greater than 18 hr. Eight versions of the IPAQ have been tested for concurrent and criterion validity, using accelerometers, and test–retest reliability over 7 days in several international settings, including Canada (Craig et al., 2003). The short form has also been evaluated for intraclass correlation, receiving a "substantial" correlation (r = 0.68; Brown, Trost, Bauman, Mummery, & Owen, 2004, p. 210).

We also asked participants if they were willing to wear a pedometer for 3 days. Tudor-Locke et al. (2005) found that pedometer recordings of 3 consecutive days demonstrated the same average step count as recordings of a 7-day period, and pedometers have also been found to be a feasible way to measure PA objectively (Tudor-Locke, Lind, Reis, Ainsworth, & Macera, 2004). Because the IPAQ asks about a 7-day period, collecting 3 days of pedometer data allowed for the pedometer data to be comparable to the IPAQ scores.

We contacted those who were willing to wear a pedometer to confirm their willingness to wear the pedometer for 3 consecutive days. Of these participants, 28 met with the primary investigator. During this meeting, we provided the participant with another information letter and all participants signed the informed consent for this portion of the study. The participant's height and weight were then measured and the height measure was used to program the stride length into the New Lifestyles NL-1000 pedometer. We then showed the participant how to wear the New Lifestyles NL-1000 pedometer and described when to wear the pedometer. Next, we set

up a follow-up meeting for the participant to return the pedometer. We also explained to the participant that the pedometer would be sealed for the time it was worn. This was following the suggestion by Tudor-Locke that allowing participants to see or record their daily step counts may result in the participants attempting to increase their step count in the following days (Tudor-Locke, Bassett, Shipe, & McClain, 2011). Participants wore the pedometer during their waking hours. They also kept a log of when the pedometer was attached and when it was removed. Participants could add notes to the log such as illness, reasons for not wearing the pedometer (e.g, forgot), or activities that may not have been recorded by the pedometer (e.g, swimming, upper body exercise). Participants did not wear the pedometers when sleeping, swimming, or bathing. The other sections of the online survey asked about other health behaviors and life changes and are not reported here. We collected data between the Fall 2011 and Winter 2012 terms.

Data Analysis

We performed data analysis using SPSS (version 19). We performed correlational analyses to address the relationship between current PA and total and total types of PE classes. The MET-minutes per week and the sitting minutes per weekday scores from the IPAQ and the average daily step count from the pedometer data represented current PA. We also compared the objective and subjective measures of PA using correlational analysis to determine if they were related.

We then performed *t* tests to compare the current PA level of those who elected to enroll in each type of PE course to those who only enrolled in the required Grade 9 or 10 course. A different type of PE was considered a course with a different course code with the exception of the year indicator. Types included Healthy Active Living Education, Personal and Fitness Activities, Large Group Activities, Individual and Small Group Activities, Aquatics, Rhythm and Movement, Outdoor Activities, Health for Life, Exercise Science, and Recreation and Fitness Leadership.

Results

Participants took an average of 3.5 secondary PE courses (see Table 2). Participants who reported taking more than 10 PE classes

were removed from the data set ($n = 9$) because curricular restraints would have made this unrealistic. Table 2 shows descriptive data for total types of PE classes taken. We examined the current PA of participants using sitting time, PA level from the IPAQ, and step counts for those who participated in the pedometer portion of the study (see Table 3).

Table 2
Means and Standard Deviations for Physical Education

Descriptive data	Total sample $n = 112$	University students $n = 94$	College students $n = 17$
Total Physical Education Classes			
n	103	87	15
M	3.50	3.47	3.53
SD	2.41	2.50	1.88
Total Types of Physical Education Classes			
n	103	87	15
M	2.11	2.15	1.87
SD	1.44	1.54	0.74

Table 3
Means and Standard Deviations for Physical Activity

Descriptive data	Total sample $n = 112$	University students $n = 94$	College students $n = 17$
MET-minutes per week			
n	109	93	15
M	3709.93	3428.01	5545.20
SD	3158.57	2504.81	5610.07
Sitting minutes per weekday			
n	112	94	17
M	515.14	543.57	363.53
SD	239.66	242.39	164.96
Average steps per day (Pedometer)			
n	28	26	2
M	9210.46	9282.08	8292.50
SD	3206.65	3295.54	2073.94

We compared the total number of classes to the current PA level from the IPAQ (n = 97) and pedometer data (n = 28) and found no correlation between the variables (see Table 3). We found a significant weak negative correlation (r = -0.228, p < .05) between sitting time as reported in the IPAQ and total number of reported PE classes taken during secondary school. Therefore, those who reported taking more PE courses during secondary school reported sitting significantly less on weekdays as an emerging adult.

Courses with a different course code, with the exception of grade level, were considered a different type of course because the curricular foci are different for courses with different course codes. We compared the total number of types of classes to the current PA level from the IPAQ (n = 97) and pedometer data (n = 28) and found no significant correlation. We did not find a significant correlation between sitting time as reported in the IPAQ and the total types of PE (see Table 4).

Table 4
Bivariate Correlations

PA measurement	1	2	3	4	5
1. Total MET-minutes per week	1				
2. Sitting minutes	-.183	1			
3. Average steps per day	.136	.135	1		
4. Total PE Classes	.076	-.228*	-.070	1	
5. Total Types of PE Classes	.012	-.191	-.142	.785**	1

Note. PA = physical activity; PE = physical education.
*p < 0.05. **p < 0.01.

To further explore the relationship between types of PE taken during secondary school and current PA, we compared individuals who only took one (mandatory for the secondary graduate requirement) course to those who took the mandatory course as well as at least one course in the specific type being analyzed. To complete this, we used t tests with the MET-minute score as the dependent variable. We compared PA level for each type of PE class independently to only taking the mandatory class (M = 2539.55, SD = 1484.69), and those who had taken a Personal and Fitness Activities (M = 3878.47, SD = 3222.29; t = 2.02, df = 46.82, p < .05), Exercise Science (M = 3990.71, SD = 2901.34; t = 2.01, df = 47, p < .05), or Recreation

and Fitness Leadership (M = 5069.06, SD = 3132.92; t = 2.41, df = 11.17, $p < .05$) course reported being significantly more active than those who only took the mandatory course. Due to a significant Levene's test, we did not assume equal variances. We did not find a significant difference in reported activity level for taking any of the other types of PE courses compared to only taking the mandatory course.

Discussion

In this study, we sought to examine the relationship between PA levels of postsecondary students and their past total amount of PE and type of PE taken during secondary school in a Canadian context. We did not find support for a link between current PA and total amount of secondary school PE. We did not find a relationship between total number of different types of PE taken and current PA.

One factor to consider is the self-selection hypothesis, which "posits that those who have a hereditary disposition to fitness and motor performance participate more often in physical activity both at a young age and in adulthood than those who do not have the same disposition" (Telama, 2009, p. 193). Because we did not control for this type of trait, it is possible that the disposition for PA may override any effect that PE may have on an individual. It is possible that a hereditary factor may be strong enough that it may explain the lack of link between overall participation in PE and current PA as an emerging adult.

However, in this study when we compared enrollment in individual types of PE to completing only the single mandatory course, enrollment in any of the three types of courses was related to a report of more activity as an emerging adult. This follows Sallis and McKenzie's (1991) observation that a

> sports-oriented physical education program may not influence adult activity levels, yet a health-oriented physical education program that teaches carryover activities would be more effective in preparing children for a lifetime of physical activity. (p. 131)

The first of the three types of PE courses in which participants showed a significantly higher PA level as an emerging adult was the

Personal and Fitness Activities course. This course could be offered from Grades 9 to 12 with a focus on individual fitness activities such as weight lifting (Ontario Ministry of Education, 1999a, 1999b). It is possible that skills gained in this type of course are applicable to the postsecondary students, resulting in increased PA. Many postsecondary institutions provide weight training and fitness equipment for students to use. The students who took the Personal and Fitness Activities course may already be more comfortable with using this type of equipment, allowing them to be more active. It would be interesting to determine if this relationship remains for postsecondary students who are not provided with these facilities.

The second course type in which participants had higher levels of PA as an emerging adult was Exercise Science. This course was only offered at the Grade 12 level and "focuses on the study of human movement and of systems, factors, and principles involved in human development" (Ontario Ministry of Education, 1999b, p. 24). This course did not involve an activity component; however, it allowed students to gain the knowledge of how the upcoming life change may influence PA and the values of remaining active over the life span. This knowledge may increase the individual's value for PA when they enter postsecondary education and increase their ability to remain active as an emerging adult.

The final course in which participants indicated a significantly higher PA level as an emerging adult was Recreation and Fitness Leadership. Again, this course was offered only at the Grade 12 level (Ontario Ministry of Education, 1999b). The course "focuses on the development of leadership and coordination skills related to recreational activities" (Ontario Ministry of Education, 1999b, p. 29).

This course, similar to the Exercise Science course, did not involve an activity component. It may also have given knowledge to students that they can apply after completing the course such as the skills to coordinate recreational activities not only for others but also for themselves. They also may gain knowledge of the value of PA that may translate into a greater value for remaining personally active through the life span.

The two latter courses also have another benefit in relation to individuals remaining active as emerging adults. Both courses are designated at the Grade 12 level. It may be that skills gained in the

mandatory course may be lost because many students take this course early in their secondary school career. Individuals may be more aware of the transitions related to emerging adulthood when they are enrolled in a course in Grade 12 than when they are enrolled in a course in Grade 9.

In 2002, Corbin suggested that other skills besides typical motor skills should be emphasized in the PE classroom. He specifically noted that "self-management skills" (p. 136) need to be taught for students to gain the knowledge in the classroom to become active adults. The latter two courses seem to include an emphasis on these types of skills. It is possible that the reason for the lack of relationship between total PE classes and PA in emerging adults might have been due to the lack of focus on these organizational skills during some secondary school PE classes.

As mentioned, the Ontario Ministry of Education introduced a new curriculum for implementation during the 2015–2016 school year. The curriculum has similar goals; however, course content has changed slightly. Several of the significant changes have been in the Healthy Living portion of the curriculum, which has little focus on PA. As the new curriculum is implemented, future research should examine whether the change in content is more successful in helping students postgraduation in their PA participation.

This study offers support for the assertion that course content matters when exploring a relationship between PE and PA. Although the curriculum stipulates that a main goal is lifelong activity for the student, this may not be a main focus in many PE classes, something that others (e.g., Kirk, 2005; Penney & Jess, 2004) have suggested is problematic if the goal is a lifelong PA participant. In Ontario's recent secondary curriculum, changes have been made to the Living Skills strand of the curriculum, which now focuses on "personal skills," "interpersonal skills," and "critical and creative thinking" (Ontario Ministry of Education, 2015, pp. 26–29). Consideration of the idea to emphasize life skill development may be particularly salient here.

Limitations and Future Directions

This study has several limitations. First, a small number of college student participants in the sample precluded between-group analysis with university-enrolled students. We also collected data during the Fall 2011 and Winter 2012 term for students, and as such,

reported current PA may have been lower than if data were collected during spring and summer months (e.g., Tucker & Gilliland, 2007). Next, student enrollment in PE in Ontario is related to gender, BMI, smoking status, and other personal characteristics as well as school-level characteristics (Hobin et al., 2010). These differences between those who choose to enroll in multiple classes and those who choose to enroll only in the required course make it difficult to control for personal factors that may influence PE enrollment and lifelong PA. Other PE curriculums in Canada (and potentially internationally), such as the Manitoba curriculum (Manitoba Education n.d.), require students to complete more than one course to complete secondary schooling. Researchers should examine differences between individuals who are required to take more than a single PE course during secondary school and those who are required to take only one PE course, to avoid the limitation of having a population who elect to take multiple PE classes and to better control for personality differences.

Another limitation for this study was that we did not ask participants which courses their secondary school offered. It may be that some individuals took a smaller number of elective courses or did not take different types of courses because of the course offering available at their institution. Researchers should examine the relationship between PE and PA after high school graduation with course offering in mind. International comparisons in curricular content are also of interest here. Further, we did not ask participants about the types of PA in which they currently engage as emerging adults, to connect this back to the type of PE courses taken. We also did not have information on the specific content (types of activities) for each course as experienced by participants. Researchers could explore the relationship between activities experienced in PE and types of PA engaged in during adulthood. PA was also assessed via self-report for the entire sample, which is not as strong a measure compared to if pedometers had been available for the entire sample. It is also possible that the past week of PA was not a typical week for participants. Participants were asked to wear pedometers for 3 days of "normal day-to-day activity."

Conclusion

This study was a starting point for examining the complex relationship between secondary school PE and PA over the life span, and it yielded mixed results. Longitudinal research is needed to track activity patterns and PE enrollment and course offerings across time, in particular in light of the new secondary school health and PE curriculum in Ontario. At the same time, researchers need to explore the skills being taught in the PE classroom and pay special attention to class type to determine if PA over the life span is different dependent on skills taught in different courses.

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PROFESSIONAL DEVELOPMENT

PE Central: A Possible Online Professional Development Tool

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Abstract

Traditional professional development offerings for teachers often overlook the needs of the physical educator. Left to their own devices, PE teachers frequently turn to online resources (e.g., PE Central, PHE America [formerly pelinks4u], PHYSEDagogy, and SHAPE America's Exchange and Teacher's Toolbox) for professional growth support. Clearly these online offerings provide valuable resources to teachers, but it is unclear if any meet generally accepted definitions of what constitutes sanctioned professional development. The purposes of this study were to (a) describe pre- and in-service teacher usage of one of these websites, PE Central; (b) describe their satisfaction with PE Central; and (c) assess the relationship of these online resources to promote provisional teacher change, student engagement, and permanent teacher change. PE teachers (n = 418) responded to an online survey. Both pre- and in-service teachers averaged monthly usage and were more satisfied than not with the PE Central website. PE Central provided teachers some key elements of professional development and was positively related to provisional teacher change but negatively associated with student engagement and permanent teacher change. Suggestions for making the site a resource for sanctioned professional development credit and associated future research possibilities are explored.

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Traditional models of professional development (PD) are typically described in terms such as the following: "Professional development shall be comprised of professional learning opportunities aligned with student learning and educator development needs and school, school district, and or state improvement goals" (New Jersey Department of Education, 2014, "New Definition," see table, row 1, column 2). *Sanctioned* PD, then is the *formal* provision of time and resources allocated by the sanctioning body (i.e., school, district, or state) to provide training that the body deems sufficient to meet its criteria and goals to gatherings of educators. Traditionally, these once or twice yearly trainings have involved educators across all disciplines. Recent approaches such as *professional learning communities* (most often small groups of discipline-specific teachers) that are organized to address *local needs* and devise, implement, and assess solutions (O'Sullivan, 2007) are also gaining popularity. *Nonsanctioned* or *informal* sources of PD include popular online affordances of discipline-specific websites such as PHE America (formerly pelinks4u), PHYSEDagogy, and SHAPE America's Exchange and Teacher's Toolbox. These resources provide ideas about lesson plans and assessment, among other resources, to interested teachers at their convenience via their computers. The focus of this study is whether one particular online resource website, PE Central, is providing more than just resource files to interested teachers. In other words, does it rise to the level of providing teachers with sanctioned PE-specific training that leads to positive changes in learner outcomes and accomplishes school, district, and state goals? Indeed, the existence of PE Central and other such online resource sites is a direct result of PE-specific PD needs having been overlooked. Inspired solely by the notable popularity of this site, we conceived and conducted this study independent of any incentives provided by PE Central.

Unfortunately, the unique content and pedagogical needs of physical educators are often overlooked in traditional PD activities offered in school- or district-based teacher in-service trainings that are primarily designed for classroom teachers (Armour & Yelling, 2004). Thus, Bechtel and O'Sullivan (2006) understandably called for more physical education (PE)-specific PD for public school PE teachers. The intent of such PE-specific PD is to promote positive, ongoing teacher change by PE teachers setting personal goals to implement

information from training sessions and improve their professional practice (Bechtel & O'Sullivan, 2006). However, the shift from PD to positive teacher change, even for classroom teachers, is not ensured. Rather, positive teacher change is often a voluntary and disjointed process in which teachers can ignore or adopt training as they see fit (Bechtel & O'Sullivan, 2006). Further, we argue that positive teacher change, although laudable, is a necessary but insufficient indicator of the efficacy of PD activities (sanctioned or otherwise). Unless PD also results in positive changes in student learning, achievement, and attitudes, then clearly it falls short in its ultimate purpose. In an attempt to understand these relationships better, Guskey (1986, 2002) proposed that a successful transference is a process that follows a predictable ordering that *links* (a) PD in-service training to (b) positive teacher change and subsequently to (c) improvements in learner outcomes.

Linking Professional Development to Teacher Change and Learner Improvements

Guskey (1986, 2002) described a four-stage model of teacher-change processes (see Figure 1), positing that ideas from PD (Stage 1) must first be implemented on a provisional basis (Stage 2) so that their value can be evidenced by increased student engagement and achievement (Stage 3), leading ultimately to permanent change in teacher attitudes, beliefs, and practices (Stage 4). Although evidence supports the relationship between student engagement and permanent teacher change (i.e., only if it works for the students will teachers retain the practice), the entirety of Guskey's model, specifically the existence of provisional change, has yet to be established.

Stage 1: Intentional Professional Development

Guskey (1986, 2002) described PD as a purposeful effort (sanctioned/formal or nonsanctioned/informal, either in groups or as individuals) with specific goals and a plan intended to *change* teacher attitudes, beliefs, and practices. To accomplish this, PD activities and presentations are geared first toward changing teacher attitudes and beliefs before changing teacher expectations of implementing new PD ideas. If especially effective, PD has provided teachers with sound and tried suggestions that will have a good

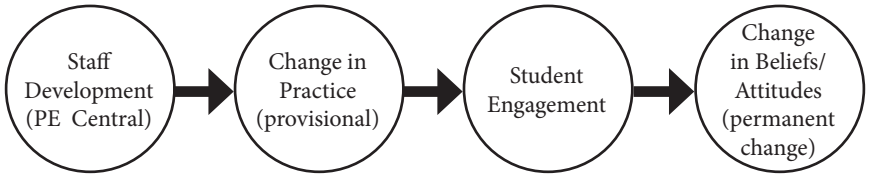

Figure 1. Guskey's model of teacher change. This model suggests that successful PD yields provisional teacher change, followed by increased student engagement, and ultimately results in permanent teacher change in teacher beliefs and attitudes. Adapted from "Staff Development and the Process of Teacher Change," by T. R. Guskey, 1986, *Teacher and Teaching, 15*(5), 5–12.

chance at succeeding. If, however, teachers have uncertainties about implementation, teacher belief will be undermined. Done properly, PD must gain some measure of investment or commitment from teachers either by involving teachers-as-experts or by using compelling presentations and content that convince teachers to at least try the new ideas.

Stage 2: Provisional Change; Let's Give It a Go!

Stage 2 begins as a temporary, experimental implementation of a new instructional approach, use of unique or updated materials, or change in procedures or formatting. During this stage, willing teachers are waiting to see if these changes work, specifically if they result in positive changes in student engagement and learning outcomes. Teachers are more likely to retain practices that help students attain desired learning outcomes.

Stage 3: How Does It Affect the Students?

Guskey (1986, 2002) argued that teacher attitudes and beliefs truly change only after teachers see evidence of increased student engagement and learning outcomes, including cognitive and psychomotor indices and a wide range of affective characteristics. Such evidence of student learning might include students' scores on tests and exams, results from standardized achievement tests, attendance at school or in class, engagement in class discussions, motivation for learning, and attitudes toward class.

Stage 4: Positive Teacher Change

In Stage 4, positive student indicators foster increased teacher belief, and positive teacher attitudes often lead to the adoption of new ideas. Ultimately, the success or failure of PD endeavors is whether training has resulted in permanent teacher change to align with the intent of that PD.

Last, these four stages described by Guskey (1986, 2002) are not entirely linear. Rather, they represent only one cycle that begins anew with the next PD activity. Even so, traditional PD formats (e.g., once or twice yearly) still may suffer from a too infrequent offering and lack of ongoing support during Stages 2 to 4. These shortcomings of traditional PD have led many teachers to seek new ideas in other venues, for example, through easily accessed online sources.

Traditional Professional Development and 21st Century Alternatives

Researchers from the Pew Internet and American Life Project (Zickuhr & Smith, 2012) have found that 78% of U.S. adults participate in a variety of online affordances, including online professional training. For educators, online PD is currently evolving (Carter, 2004) and is not without challenges. However, few would doubt the logic of its potential to provide a wealth of information in a variety of formats including virtual collaborations, active learning, and mobile multimedia technologies (Carr, 2010; Carter, 2004) that could prove effective in promoting PD and teacher change.

PE Central

PE Central (www.pecentral.org) may be one of the largest PE-specific online resources available for information such as lesson ideas, best practices, class management, use of technology, and assessment ideas. PE Central archives 10,000 resource files and receives some 162,000 visitors and over 1.6 million page views each month, with lesson ideas being the most commonly viewed resource (M. Manross, personal communication, January 21, 2012). The site has received a number of awards and recognitions for its contribution to the field (see PE Central, n.d.).

Although PE Central was conceived and created and is maintained with the sole purpose of providing PE teachers with *resources*,

we think that it exhibits some of the characteristics of PD for PE teachers. For example, all PE Central resource materials have been submitted and peer reviewed by fellow PE professionals. Further, visitors are allowed to engage in the ongoing dialogue by providing additional suggestions to the content. This virtual, professional collaboration promotes the development of and participation in what may be considered an online *professional learning community* (Beddoes, Prusak, & Hall, 2014)—a key characteristic of PD programs (Carr, 2010; Carter, 2004; O'Sullivan & Deglau, 2006). It provides extensive and valuable information to pre- and in-service teachers and teacher educators. However, despite its obvious popularity, what remains unclear are (a) how PE Central is being used, (b) what level of satisfaction its users experience, and (c) whether PE Central can be considered a valid professional learning community that provides its own PE-specific PD that in turn facilitates teacher change.

Therefore, the purposes of this study were to (a) describe pre- and in-service teachers use of PE Central, (b) describe their satisfaction with PE Central, and (c) assess the relationship of these online resources to promote provisional teacher change, student engagement, and permanent teacher change as proposed by Guskey (1986, 2002).

Method

Participants and Setting

Participants in this study ($N = 418$) included preservice ($n = 45$), beginning (1 to 3 years of experience; $n = 45$), and veteran (4+ years of experience; $n = 288$) teachers, along with a convenience sample of nonresponders ($n = 40$) from the Southwest District of the American Alliance for Health, Physical Education, Recreation, and Dance (SWD AAHPERD). The study included teachers from Arizona, California, Guam, Hawaii, Nevada, New Mexico, and Utah, whom we contacted through their state AHPERD organization. We coordinated with physical education teacher education (PETE) faculty at various universities within SWD AAHPERD to sample a group of undergraduate PETE licensure students. The sample for this study was self-selected; that is, participants chose whether to accept the invitation to respond.

Procedures

The university institutional review board approved all procedures. We sent an e-mail including a clause of implied consent and a link to a Qualtrics (www.qualitrics.com) survey to state AHPERD organization members to invite them to participate in this study. Participants who completed the survey within 1 week were entered in a drawing for a $100 gift certificate for PE equipment. At the beginning of the second week of data collection, we sent a follow-up e-mail reminding members who had not completed the survey to do so by the end of the week to qualify for a second drawing for a $100 gift certificate.

Moser and Kalton (1974) recommended including a sampling of nonparticipants (with a target of 10% of nonresponders) to account for bias due to nonresponse. A bias might have been detected if the responses of the responders and those of the nonresponders had differed in a systematic way. We asked a convenience sample of nonresponders (n = 40) to complete the survey, and we compared their responses to those of the initial responders to assess generalizability (Moser & Kalton, 1974). We considered the lack of systematic differences as evidence that nonparticipants did not differ significantly, allowing generalization of the survey results.

Data Collection and Analysis

We provided a two-part Qualtrics (www.qualtrics.com) survey to the study participants. Following the 2-week data collection, we analyzed participants' responses with SPSS software, using a chi-squared test on the bivariate contingency tables. We identified group differences using cross tabulations on variables of interest.

Instrument. We used standard development procedures to compose and pilot survey questions based on a Likert scale (Moser & Kalton, 1974; Patten, 2011; Peterson, 2000). We derived questions from the survey from a combination of sources in traditional (Armour & Yelling, 2004; Guskey, 1986, 2002) and online (Carr, 2010; Carter, 2004) PD literature. Finally, we used input from PE Central's executive director to make the survey tool more website specific (M. Manross, personal communication, January 13, 2013). Section 1 of the survey assessed the nature of teachers' experience with PE Central: their (a) usage (e.g., How often, on average, do you

visit PE Central?) and (b) satisfaction (e.g., I am satisfied with the usefulness of information on PE Central compared to other sources of professional information).

Section 2 assessed teacher perceptions of the proposed structure of Guskey's (1986, 2002) framework for teacher change. The Guskey Teacher Change (GTC) is a 16-item four-subscale survey created to assess teacher perceptions of PE Central as (a) providing a useful source of PD; (b) provisional change in their teaching behaviors; (c) changes in student engagement and achievement; and (d) permanent changes in their, beliefs, attitudes, and practices. The GTC survey was scored on a Likert scale (1 = *strongly agree*, 2 = *agree*, 3 = *disagree*, 4 = *strongly disagree*), and we tested all four subscales for reliability using Cronbach's alpha. Table 1 lists the 16 GTC questions.

Table 1
Change Subscale Items Based on Guskey's Model

Subscale and questions
Professional Development
• PE Central provides ideas that help me overcome barriers I face as a physical educator.
• PE Central provides me professional support that I do not get from my school and/or district.
• I use PE Central as a source of PD.
• PE Central provides me help with the practical day-to-day operation of my PE classes.
Provisional Teacher Change
• I have experimented with different classroom practices as a result of using PE Central.
• I have experimented with new instructional approaches (how I teach) as a result of using PE Central.
• I have experimented with new lesson content (what I teach) as a result of using PE Central.
• I have made modifications in my PE classroom management as a result of using PE Central.

Table 1 (cont.)

Subscale and questions
Student Engagement • Because I used ideas from PE Central, my students' test scores (e.g., PE quizzes/exams) have increased. • Because I used ideas from PE Central, my students' attitudes have improved. • Because I used ideas from PE Central, my students' effort has increased. • I have not seen any improvement in my students as a result of my using ideas from PE Central.
Permanent Teacher Change • Ideas I have found on PE Central have become a permanent part of how I teach. • I have changed how I teach because ideas from PE Central worked better than what I was doing before. • I have made permanent changes to my beliefs about PE as a result of using PE Central. • I have made permanent changes to my attitudes about PE as a result of using PE Central.

Note. All questions are based on a 4-point Likert scale.

We sent early drafts of the survey to five PETE professors who were familiar with PE Central to assess face validity prior to the completion of a pilot test using cognitive interviewing techniques (Willis, 2005) to further develop and refine the survey. The pilot identified and remedied issues with survey items and with the functionality of Qualtrics.

Data analysis. We analyzed descriptive data using SPSS to find means, standard deviations, and correlations among variables of interest. We analyzed differences regarding usage and satisfaction among preservice, beginning, and veteran teachers using a chi-squared test on the bivariate contingency tables. We identified group differences using cross tabulations on variables of interest.

We calculated the subscale means for the GTC survey by averaging the scores of the four respective items. We calculated Cronbach's alphas to estimate the internal consistency and reliability of each

subscale. We calculated Pearson correlations to test the magnitude and direction of the relationship of the four subscales. We used subscale means for subsequent between-group analyses (e.g., beginning vs. veteran teachers) using a one-way ANOVA. Finally, we calculated effect sizes via Cohen's d ($M_1 - M_2 / SD_{pooled}$) for the between-group differences on the GTC subscales.

Results

Descriptive Results

Table 2 presents the means, standard deviations, and frequencies for selected variables of usage and satisfaction. Most teachers were satisfied with their monthly usage of PE Central. Table 3 shows the moderate correlations between usage, satisfaction, and the four Guskey (1986, 2002) subscales. Table 4 displays the means, standard deviations, levels of significance, effect sizes, and alphas for the four variables concerning the GTC scale.

Table 2
PE Central Users' Means, Standard Deviations, and Frequencies

Variable	Frequency *n* (%)		*M*	*SD*
Usage		–	1.94	.61
Never	16	(4.6)		
Monthly	192	**(55.5)**		
Weekly	79	(22.8)		
Daily	59	(17.1)		
Total	346			
Satisfaction		–	1.99	.66
Very Satisfied	63	**(19.9)**		
Satisfied	209	**(65.9)**		
Rarely Satisfied	33	(10.4)		
Never Satisfied	12	(3.8)		
Total	317			

Note. Mean usage and standard deviation are calculated in terms of all responders; frequencies indicate the total number of responses in each category with percentages for each. Means and standard deviations indicate satisfaction for all responders with total frequencies for each category and percentages for each. Bolded numbers indicate notable frequencies.

Table 3
Pearson Correlations for Variables of Interest and Components of the GTC Scale

Variable/component	1	2	3	4	5	6
1. Usage		.416	.450	.492	.425	.430
2. Satisfaction			.620	.562	.479	.540
3. Guskey professional development				.784	.617	.701
4. Guskey provisional teacher change					.714	.754
5. Guskey student engagement						.674
6. Guskey permanent teacher change						

Note. Pearson correlations for two variables of interest and the four components of the GTC scale. All correlations are significant at $p < .001$.

Table 4
Guskey's Teacher Change Scale Subscale Items, Item Means and Standard Deviations, Levels of Significance, Effect Sizes, and Alphas

	Group						
	Beginning teachers		Veteran teachers				
Subscale item	*M*	*SD*	*M*	*SD*	Sig	ES	α
Professional development	2.56	.65	2.45	.58	.306	.19	.81
Provisional teacher change	2.58	.7	2.47	.64	.356	.17	.89
Student engagement	2.78	.61	2.62	.54	.133	.29	.81
Permanent teacher change	2.86	.56	2.72	.55	1.94	.25	.86

Note. ES = Cohen's $d = (M_1 - M_2) / SD_{pooled}$. The magnitude of effect sizes was determined based on Cohen's guidelines for interpreting effect size (e.g., *d* of .2 = small, .5 = moderate, .8 = large). There were no significant differences between groups on variables of interest ($p < .05$).

Between-Group Comparisons

Of all of the responders, 13% began the demographic portion of the survey but did not complete the questions on usage and satisfaction or the GTC scale because they had never visited the PE Central website. We completed comparative analyses between all three groups (preservice, beginning in-service, and veteran in-service). We found no significant differences in usage or satisfaction between beginning and veteran teachers. Both groups reported using the

site monthly on average and were equally satisfied with PE Central. Finding no significant differences between the two in-service groups, we combined responses for these teachers into one in-service group for subsequent analyses.

Next, we completed a comparative analysis between in- and preservice teachers using a Yates's correction for continuity (chi-squared) test. We found no significant difference in the usage of PE Central between in- and preservice teachers ($\chi^2 = 2.54$, $df = 1$, $p = .111$). We found no significant differences with respect to satisfaction ($\chi^2 = 2.59$, $df = 2$, $p = .275$). Overall means ($M = 1.99$) and effect sizes indicated that all groups comprised more satisfied than dissatisfied users.

We found no significant difference between voluntary responders and nonresponders in the areas of usage ($\chi^2 = 3.402$, $df = 3$, $p = .334$) or satisfaction ($\chi^2 = 3.014$, $df = 3$, $p = .389$). Additionally, we found no significant difference between groups in the numbers of teachers who had never visited PE Central. It appears that awareness saturation of PE Central is high, with only about 13% of all participants indicating no exposure to the site.

Reliability of Scale Based on the Guskey Teacher Change Model

Cronbach's alphas for the survey confirmed reliability of the GTC subscales designed to understand use of PE Central as a PD tool for physical educators consistent with Guskey's (2002) model of teacher change. Alpha values confirmed reliability in PD, provisional teacher change, student engagement, and permanent teacher change ($r_{\alpha = .81–.89}$, see Table 3).

Questions focused on the potential of PE Central as a PD tool were given only to in-service teachers. In-service teachers agreed slightly ($M = 2.46$) that resources provided by PE Central helped them overcome barriers, provided support not received from schools and districts, and helped with practical day-to-day operations. This is noteworthy in that although PE Central was not designed to be a source of PD, it seems to provide key elements of such trainings. In-service teachers likewise agreed slightly ($M = 2.49$) that their use of PE Central resulted in provisional change in their classrooms, having had experimented with new practices, instructional approaches, lesson content, and classroom management strategies—

again, noteworthy because PE Central provided willing PE teachers with resources in a way that convinced them to at least try new practices. However, in-service teachers disagreed slightly ($M = 2.68$) that student engagement had increased in their classrooms as a result of PE Central. Similarly, in-service teachers disagreed slightly ($M = 2.74$) that their use of PE Central had resulted in permanent changes in their practices, attitudes, and beliefs in day-to-day teaching. However, teachers concluded that the ideas on PE Central had worked better than some of their earlier practices (Table 3).

Discussion

The purpose of this study was to describe (a) the nature of PE Central usage, (b) describe the satisfaction of pre- and in-service teachers who use PE Central, and (c) to assess the relationship of the site's resources to promote provisional teacher change, student engagement, and permanent teacher change as described in the GTC model.

Usage

Teachers from all groups (preservice, in-service, and nonresponding teachers) reported using PE Central monthly, on average. Considering that there are over 162,000 visits each month, it is clear that PE teachers are actively seeking out a source of readily available information to guide or supplement their practice. However, it is equally clear that these visits lack any systematic structure that could fully be described as *intentional* PD. Rather, teacher access to PE Central resources more closely reflect what Bechtel and O'Sullivan (2006) described as voluntary and disjointed—occurring at the teachers' convenience and according to their needs.

Satisfaction

Not surprisingly, frequency of use and satisfaction with PE Central were positively related to the manner in which the teachers used it. Most teachers from all groups indicated being more satisfied than not with the resources on PE Central, a notion supported by their frequent use of it. Armour and Yelling (2004) argued that effective PD provides teachers with what they need (i.e., satisfaction) by focusing on the delivery (Baranowski & Jago, 2005) and value

(Tozer & Horsley, 2006) of information provided. Likewise, Fejgin and Hanegby (1999) found that in-service teachers face difficulties accessing the type and amount of needed PD, and Ince, Goodway, Ward, and Lee (2006) added that PE teachers report lacking the knowledge and skills to access the technologies and implement the practices in their classrooms. Thus, satisfaction might increase if interactions with PE Central were evermore user friendly.

PE Central as a Source of Professional Development

The GTC scale was developed with the intention to assess teachers' use of PE Central in terms of Guskey's (1986, 2002) proposed framework of teacher change. Alphas confirmed internal consistency. Although we found no statistically significant differences when comparing beginning teacher, veteran teacher, and nonresponder results, trends in mean differences indicate a small effect among groups. Veteran teachers agreed more than not that their usage of PE Central had resulted in increased student engagement and permanent teacher change than did beginning teachers. Also notable, in-service teachers disagreed slightly that their usage of PE Central was resulting in permanent change, yet they agreed that ideas found on PE Central worked better than ideas they had implemented previously. This contrast in responses brings to light the difficulty in creating permanent teacher change related to teacher attitudes, beliefs, and practices (see Guskey, 1986, 2002).

As predicted by Guskey (1986, 2002), correlations suggested a moderately strong relationship among the variables within the GTC scale. It appears that as teachers increase their use of PE Central, they may begin to view the site as a PD source and subsequently may increase provisional changes, be more attentive to student engagement, and be more likely to implement permanent change. We suggest that teachers might be actively recruited and motivated to use PE Central more often if they could earn continuing education credits by doing so. As teachers visit the site more frequently, particularly in a structured, systematic fashion with a clear PD focus and sanctioned outcomes, PE Central may have more potential to result in teachers' change of attitudes, beliefs, and practices (see Guskey, 1986, 2002).

Implications for PE Central and Future Research

PE Central is currently serving its expressed purpose—a rich online clearinghouse of PE-specific resources. However, if PE Central desires to expand its already considerable reach, we suggest that it also consider its possible role as a source of PE-specific, online PD. PE Central's online presence and reputation could allow it to alleviate the all too common void of PE-specific PD available locally. We further suggest that an opportunity exists to provide a low-cost PD alternative to teachers and districts alike.

Such opportunities may include partnerships involving states or continuing education institutions as sources of teacher training. Although PE Central is not currently recognized by school districts and states as a source of PD, offering continuing education credits through partner educational institutions and state licensure programs may increase teachers' site usage and satisfaction. Therefore, we suggest that PE Central create a series of learning modules including providing teachers with accessible (Baranowski & Jago, 2005) and relevant context-specific topics such as assessment, management, and lesson ideas (Armour & Yelling, 2004).

If PE Central were to move in this direction, we would recommend that additional research into its form, function, and effectiveness accompany the endeavor. Perhaps, for example, the proposed relationship between the four stages of Guskey's model of PD could be examined to deepen understanding of the mechanisms of positive teacher change.

Further, we recognize the immense opportunity that PE Central faces—the creation of a virtual professional learning community facilitated by online affordances (e.g., discussion boards, resource files, suggestion box, management and instruction tips, lesson planning, support materials, research synthesis, and advocacy tips). In a virtual sense, PE Central has a greater reach than any of the local, state, or national PE organizations. We would encourage all like-minded entities and individuals to join in a mutually successful partnership (Carr, 2010; Carter, 2004; O'Sullivan & Deglau, 2006).

If, however, PE Central were to expand to become a more prominent PD source, it would need to "formalize" a PD program.

Although PE Central contributes to PD for PE teachers, recognition of PE Central as PD is not yet strong enough. Most teachers are continuing to use the site voluntarily as a resource of convenience (Armour & Yelling, 2004), with which most indicate a degree of satisfaction. The online resource of ideas and tools for PE teachers on PE Central could increase its incentives for teachers to access the site voluntarily more regularly.

Each state has its own requirements for relicensure of teachers. However, it appears that in most states, teachers may advocate for the PD of their choice by clearing a PD source with their school administrator. After communicating with a series of state offices of education, we found that most states agree that 1 hr of coursework is equivalent to 1 continuing education credit hour toward teacher relicensure.

When we informed PE Central of these findings prior to publication, they have embraced the idea and, in consultation with experts in the field, have since created a series of PD modules, along with offering continuing credits from an accredited partner university. It will be intriguing to see who joins this learning community.

We suggest that additional research be conducted to compare and contrast other PE-specific online resource sites. Unfortunately, that scale of an examination was beyond the scope of this study. It could be informative to examine similarities and differences among these sites and bring further insight to efforts to ensure that PE-specific PD needs are being met and that they are effectively transferred in support of improved learner outcomes.

Last, although confirming the validity of the GTC scale is beyond the scope of this study, we confirmed the reliability of the scale. Following a confirmatory factor analysis to assess the validity of the 16-item scale, we recommend using it to study a broader population of PE Central users. Additionally, schools or districts may use the instrument in their PD activities to assess the effectiveness of content and delivery of their programs (Armour & Yelling, 2004). Once a fully valid instrument is created, it could well serve to assess the effectiveness of traditional school- or district-wide PD efforts to facilitate meaningful teacher change.

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YOU AND THE LAW

Home Owner Fails in Attempt to Gain Relief From Impact of Errant Baseballs

Tonya L. Sawyer

Donald G. Metcalf v. Town of Northbridge;
App. Ct. Mass.; 16-P-551; 90 Mass. App. Ct. 1124;
2017 Mass. App. Unpublished. LEXIS 27; 1/9/17

A Massachusetts appeals court affirmed the ruling of a trial court that a municipality in that state is protected by sovereign immunity in a case in which it was sued by a resident and his spouse who lived adjacent to a baseball diamond and claimed its use was a "nuisance" because of errant baseballs.

Complaint

The complainant "sounds in nuisance and seeks damages as well as an injunction prohibiting use of the baseball field until adequate measures are taken to abate the nuisance," wrote the appeals court. In essence, the claim rested on the allegation that the town failed to act after having been put on notice by the plaintiffs of a condition that substantially and unreasonably interferes with their enjoyment of their property.

Trial Court Ruling

The trial court granted the town's motion for summary judgment on the ground of sovereign immunity under G. L. c. 258, § 10(b) and (j), which protects a municipality from liability for acts by third parties. The plaintiff appealed.

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Facts of the Case

Plaintiff Donald Metcalf's property abuts a city-owned baseball diamond, "where various school baseball teams sponsored by the Town Parks and Recreation Commission frequently play baseball with permission from the Town school department," according to the court records.

Shortly after purchasing the property, the plaintiff observed foul balls being hit from the baseball diamond, which landed on his driveway, backyard, and garage. The court record noted that the baseballs "caused damage to the garage siding as well as the plaintiffs' vehicles." When the plaintiffs brought this problem to the Town's attention, the Town replaced the 8-ft fence that separated the field from the plaintiffs' property with a 12-ft fence. It also raised fences connecting the backstop behind home plate to dugouts on the first and third baselines from 6 ft to 10 ft. These installations were paid out of the Building and Grounds Department's budget.

Court Discussion

"When these alterations did not resolve the errant baseball problem, the Town installed a 50-foot net behind the backstop at a cost of $4,796. The net extends 20 feet higher than the backstop. Utility companies donated services to install poles from which the net is strung. Half of the installation cost was paid from the Building and Grounds Department budget; the other half was paid from the Town Public Works Department budget. Before installing the net, the Town considered and obtained private estimates for installing a more effective backstop with an 'overhang.' Price estimates were approximately $17,000 for a private entity. This price would have been higher if the Town had put the overhang project out to bid. The Town also determined that redesigning the field would be prohibitively expensive.

"Expenditures under $5,000 for projects performed by the Building and Grounds Department are within the sole discretion of its director. Expenditures exceeding $5,000 must be approved by the superintendent of the school district and school committee if not already included in the Building and Grounds Department budget. The cost of a new backstop or field redesign would require the school department to cut other school services, supplies, or,

potentially, staffing. If the funds were authorized to come from one of the school department's 'revolving accounts,' those funds would have to be replaced in the following year's budget, requiring either a higher overall budget appropriation by the Town or cutting costs elsewhere in the Town's budget.

"Further, for the Public Works Department to make a meaningful contribution to the cost of such projects, funding for other Town services it provides would have to be reduced. The same is true of contributions from the Parks and Recreation Commission. Accordingly, the Town manager, who is responsible for administering the use of Town facilities, determined that it was not in the Town's best interest to allocate funds for a new backstop or to redesign the field at the expense of other services needed in the Town. The plaintiffs admit that the specifications of other baseball diamonds in the Town would not safely or conveniently accommodate the teams that currently play at the field."

Finally, the appeals court noted that case law dictates that the Town's corrective measures are immune as discretionary functions. In addition, the Town is entitled to discretionary function immunity under § 10(b) for the initial design and construction of the baseball field. Furthermore, in *Alter v. Newton* (1993) the initial decision not to erect a fence at the time of the construction of the field was discretionary. However, the plaintiff argued on appeal that "the actual playing of the game constitutes implementation of the immunized [original] policy decisions," for which the town is not immune.

Appeals Court Ruling

"This argument is defeated by Alter," wrote the appeals court, because once the municipality made its initial policy-based decision—the design and construction of a ball field—it "shielded [itself] from liability for the consequences" of that decision (Id. at 146–147). "In other words, if a municipality's original decisions fall within the discretionary function exception, then the municipality enjoys immunity for the resulting consequences. The motion judge was accordingly correct in allowing summary judgment based on G. L. c. 258, § 10(b)."

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Label all charts, graphs, and tables and place them on separate pages. Submit all images 300 dpi with appropriate captions. Number the pages beginning with the title page followed by text, references, figure captions, tables, and figures. Figures must be clean and legible. Freehand art or lettering is not acceptable.

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