THE PHYSICAL EDUCATOR
Early Winter 2016
Volume 73, Number 4

The Physical Educator

(ISSN print: 0031-8981; online: 2160-1682)
(USPS 431-220)

of Phi Epsilon Kappa

THE OFFICIAL PUBLICATION OF
PHI EPSILON KAPPA FRATERNITY

Phi Epsilon Kappa

CONTENTS

THE PHYSICAL EDUCATOR (Print ISSN: 0031-8981, Ejournal ISSN: 2160-1682) is published four times a year in the spring, fall, early winter, and late winter by Sagamore Publishing, 1807 N. Federal Drive, Urbana, IL 61801.

POSTMASTER: Send address changes to *The Physical Educator*, Sagamore Publishing, 1807 N. Federal Drive, Urbana, IL, 61801.

The Phi Epsilon Kappa web page is located at http://www.phiepsilonkappa.org

Editorial Office

Thomas H. Sawyer, Ed.D., Editor
5840 S. Ernest Street
Terre Haute, IN 47802

Subscription Office

Sagamore Publishing LLC
1807 N. Federal Drive
Urbana, IL 61801

The Physical Educator
(TPE) Volume #74
Print ISSN: 0031-8981 | Online ISSN: 2160-1682
Quarterly publication | Print and electronic archives

	Online	Both
Ind.	$80.00	$100.00
Ind. (Int'l)	$80.00	$120.00
Inst.	$360.00	$400.00
Inst. (Int'l)	$360.00	$430.00

Average number of copies printed per issue (net press run) during the preceding 12 months is 5381; number of copies nearest to filing date is 1460. Average number of copies of each issue distributed in mass mailing to subscribers during the preceding 12 months is 4999; number of copies nearest to filing date is 1389. Average number of copies of each issue distributed free during the preceding 12 months is 167; number of copies nearest to filing date is 29.

Send address correspondence concerning subscriptions and change of address to Membership/Subscription Department, *The Physical Educator*, Sagamore Publishing, 1807 N. Federal Drive, Urbana, IL 61801. Make check or money order payable to Sagamore Publishing, order online at www.sagamorepublishing.com, or call 800-327-5557.

The Physical Educator Vol. 73 • pp. 619–638 • 2016
https://doi.org/10.18666/TPE-2016-V73-I4-6313

ADAPTED PHYSICAL EDUCATION

New Graduate Entry: Students' Transition to an Adapted Physical Education Graduate Program

Takahiro Sato, Amaury Samalot-Rivera, Francis M. Kozub

Abstract

The purpose of this study was to describe and explain master of arts students' academic and social experiences during the transition to an adapted physical education (APE) graduate program. In this study, we used the theory of transition, which allowed us to understand students' transition to graduate studies and to assist them in connecting to the academic support needed to cope with their changing circumstances. Seven APE master's students (3 men and 4 women) participated in the study, which had a descriptive-qualitative design. The data sources were a demographic questionnaire, face-to-face interviews, and the program of graduate study (archival record). Interview data were analyzed using a constant comparative method, and results in themes related to (a) difficulty in academic transition to the graduate program, (b) relationships with program faculty, and (c) experiential learning. To better support APE graduate students, we encourage academic de-

Takahiro Sato an associate professor, School of Teaching, Learning, and Curriculum Studies, Kent State University. Amaury Samalot is an assistant professor, Department of Kinesiology, Sport Studies, and Physical Education, State University of New York at Brockport. Francis M. Kozub is a professor, Department of Kinesiology, Sport Studies, and Physical Education, State University of New York at Brockport. Please send author correspondence to tsato@kent.edu

Acknowledgement: We gratefully acknowledge the grant funding support of Ohio Association of Health, Physical Education, Recreation, and Dance.

partments, administrators, faculty, and all students to learn how to view themselves as playing various roles, such as academic advisor, graduate student, graduate assistant, and fellowship graduate student.

In today's higher education, all universities are seeking the similar goal of success for their master's degree students (Johnston, 2010). American universities enthusiastically support the transition of master's degree students into their graduate programs. According to Kallio (1995), universities need to help students solve the dilemmas they face in the transition to graduate education. Although many American institutions expend major resources on recruiting new graduate students, many of these students fail in the academic and social transition from undergraduate studies or professional careers (Polson, 2003). Sato and Hodge (2009) studied adapted physical education (APE) doctoral students (focusing specifically on international students and students of color) at major research universities. They found that these students experience academic and social difficulties exacerbated by cultural differences between the culture of their undergraduate program and that of the graduate program. Moreover, students with positions as graduate assistants (GAs) have concerns about balancing their studies and teaching and about their responsibilities as GAs. They are also concerned about time demands (Sato & Hodge, 2009; Sato, Hodge, & Burge-Hall, 2011).

Graduate students in physical education, APE graduate students of color, and international students feel marginalized, alienated, isolated, discriminated against, and even that they have been targets of racism (Samuel, 2004; Sato & Hodge, 2009; Spurling, 2006). Ferrales and Fine (2005) noted that graduate students who have been away from school for a few years or who have traveled or worked at various jobs without building a career face different challenges than other graduate students do. Life stage development can significantly influence student behavior throughout graduate school (Kallio, 1995). Many graduate students arrive on campus feeling intimidated and emotionally fragile. Because of the sensitive nature of this stage in life, emphasis should be placed on investment and retention. Orienting adult students to educational programs is viewed by many as the first step toward retention. Kretchmar and Memory (2010) suggested that a campus visit prior to the first day of school can greatly influence students because of how that experience makes

them feel and because of the images it creates in their minds. Faculty and staff serve a major role in the on-site experiences of incoming students. Impressions and people-to-people interactions are highly influential.

Determining, analyzing, and understanding the transition experiences of APE graduate students are useful to their preparation and continued professional development. This is important to those concerned with ensuring equitable and successful graduate school experiences for all students. APE programs prepare graduates to demonstrate competency in teaching, research, and service for people with and without disabilities in physical activity contexts, but there is a lack of studies on graduate students' experiences in such programs. Hence, we sought to explore how graduate students at a university interpret their academic and social transition to graduate school while attending an APE program (Ellery & Stewart, 2000). This study expands the knowledge base and will help inform professional preparation programs in education.

Theoretical Framework and Purpose

The conceptual framework of this study was the theory of transition (Schlossberg, Waters, & Goodman, 1995), which was used to frame the graduate students' responses to academic and social transition while attending an APE graduate program. The theory of transition is often used to understand students' transition to graduate studies and to assist them in connecting to the academic support needed to cope with their changing circumstances (Evans, Forney, Guido, Patton, & Renn, 2010). Schlossberg defines the term *transition* as "any event, or non-event, that results in changed relationships, routines, assumptions, and roles" (Schlossberg et al., 1995, p. 27). The theory of transition was developed in relation to student academic and social maturation, characterized by the stages of "moving in," "moving through," and "moving on" (Schlossberg, Lynch, & Chickering, 1989). Schlossberg (1987) also noted that many individual transitions are not related to a person's age, but to circumstances in their lives. In studies of the graduate student transition process, it is essential that the theoretical framework account for the transitional factors that influence a student's decision and motivation to attend an APE graduate program.

Schlossberg et al. (1995) identified three types of transitions among graduate students: anticipated (e.g., the transition to APE graduate programs), unanticipated (e.g., an extreme underrepresentation of graduate students, resulting in isolation), and nonevents (e.g., expecting to join in academic support groups and not being able to do so because none are available on campus). The *context* is the student's relationship to the transition and its setting, and the *impact* is the degree to which the transition alters the individual's daily academic social routine (Evans et al., 2010). Graduate students in transition often experience feelings of inadequacy and incompetence due to unfamiliar situations and consequences. The need to feel competent relates to the need to master new situations and tasks, such as taking APE graduate courses, research-related courses, and clinical experiences for the first time. The move from incompetence to competence might be difficult for APE graduate students. It depends on the manipulation of the combination of assets and deficits in each transition to a new academic or social environment (Schlossberg & Warren, 1989).

Schlossberg et al. (1995) identified four factors (the 4Ss) in managing the transitions in academic and social environments including situation, self, support, and strategies. *Situation* includes what triggered the event, the timing, control, role change, duration, previous experiences with a similar situation, stress, and assessment (Evans et al., 2010). *Self* is the individual's personal and demographic characteristics, including age, gender, race, ethnicity, and socioeconomic status (McCoy, 2014). This factor affects how graduate students view their academic and social lives. *Support* is the types of help provided, their function, and how they are measured. This factor includes personal relationships, family, friends, institutions, and communities (McCoy, 2014). *Strategies* are the coping mechanisms employed to address the transition. They modify the situation, control the meaning of the problem, and assist in stress management (Evans et al., 2010).

The purpose of this study was to describe and explain master's students' academic and social transition into an APE graduate program. The following research questions guided the study:

1. How did APE master's students handle transitional experiences during graduate studies?

2. How were APE master's students' perspectives on graduate education (coursework, academic advising, and field experiences) affected during graduate school?

Method

Research Design

This study used an explanatory (holistic) multiple case study design (Yin, 2003). These data are unique in their focus on students' experiences transitioning into an APE graduate program. Qualitative studies typically focus in depth on small samples, even single cases, sampled purposefully (Patton, 2002). The purpose of the case study method was to understand complex educational and/or social phenomena better while retaining the holistic and meaningful particularities of real-life circumstances (Yin, 2003). In line with that logic, the explanatory case study method was appropriate for exploring APE master's students' experiences as new graduate students.

Research Site

One flagship university, College State University (CSU; pseudonym), was the site for this study. This site was chosen because it has a reputation and history of APE graduate endorsement within the master's program. The other rationale was to include participants from comparable universities in the accessible geographical region.

Participant Nomination and Selection

A nomination process was used in this case study (Yin, 2003). It consisted of collecting relevant information about the APE graduate program (Yin, 2003) and then defining the relevant criteria for nominating participants. The selection of participants involved contacting APE faculty for nominations of master's students matching the selection protocol criteria (Yin, 2003). Seven participants from the graduate program were nominated and selected for this study.

The participants were Cathy, Donovan, Jason, Ted, Nadia, Aoife, and Tiffany (all pseudonyms). The mean age was 25 years, with a range of 22–28 years. Six participants were native to the United States (New York: $n = 5$; Puerto Rico: $n = 1$), and one was from Ireland, and the participants had diverse educational backgrounds, ethnici-

ties, personalities, and cultures (see Table 1). All APE master's students (Cathy, Donovan, Jason, Ted, Nadia, Aoife, and Tiffany) hold physical education teaching licenses and have completed bachelor's degrees in physical education. All participants entered the graduate program to study new academic fields. Six participants were funded by their college or department (i.e., they held a GA position) or by federal grant fellowships.

Table 1
Master Students' Demographic Data

Pseudonym	Institution	Gender	Ethnicity	Nationality
Donovan	CSU	Male	Caucasian	USA
Aoife	CSU	Female	Irish	Ireland
Tiffany	CSU	Female	Hispanic/Latino	Puerto Rico
Nadia	CSU	Female	African American & Caucasian	USA
Cathy	CSU	Female	Indian American	USA
Ted	CSU	Male	White American	USA
Jason	CSU	Male	Hispanic Latino	USA

Data Collection

Demographic questionnaire. A demographic questionnaire was used to collect descriptive quantifiable data from the participants. This questionnaire was designed to measure how well master's students are being prepared for future careers (e.g., APE teaching positions). It consisted of three components: (a) questions to determine respondents' goals and why they enrolled in the program (e.g., motives, career goals, and job market), (b) questions about the program (e.g., transition, general information, student progress, department climate and culture, and funding), and (c) questions about selecting an advisor (e.g., research interests, advising style, and work environment).

Face-to-face open-ended interviews. According to Yin (2003), researchers have two jobs in conducting interviews: (a) to follow the interview case study protocol and (b) to ask the actual (conversational) questions. During the interview, the researcher asked participants factual questions as well as solicited their opinions about

people, places, and events related to their academic and social transitions into an APE graduate program (Yin, 2003) using a face-to-face focused interview that lasted for a short time (approximately 60 to 90 min; Yin, 2003). The interviews remained open ended and assumed a conversational tone. The modified interviews were guided by a preestablished set of questions developed by Lewis, Ginsberg, Davis, and Smith (2004) and by Sato and Hodge (2009). For this study, the specific questions were modified and carefully worded to be relevant to the current investigation of graduate students in an APE graduate program (Yin, 2003).

Interview questions. Students were interviewed using an open-ended interview protocol of 22 questions (Lewis et al., 2004; Sato & Hodge, 2009). The questions were derived from the literature on student transition, diversity, retention, and factors associated with successful completion of graduate degrees. The first eight questions focused on definitions of a transition culture, satisfaction issues, key aspects of graduate school experience, factors affecting success, and areas needing development in graduate training (Lewis et al., 2004).

Master's Program of Study (Archival Record)

The participants' graduate programs of study (archival record) were used in conjunction with other sources of information (interview transcripts) in exploring these case studies. The rationale for examining the participants' master's program was that those documents serve as an agreement between a school's graduate program studies committee and the participants regarding (a) chosen area(s) of interest; (b) intended professional goals; (c) previous courses and relevant experience; (d) the expected time schedule for undertaking the required topical seminars and writing seminars; (e) the courses expected to meet the minimum requirements of the school, accompanied by a statement of rationale; and (f) the anticipated additional courses beyond the minimum coursework requirement, accompanied by a statement of rationale.

Trustworthiness

Trustworthiness was established through triangulation, member checking, and peer debriefing. Triangulation involved the use of multiple data sources, including data from the interview transcripts, demographic questionnaire, and master's program. The purpose of

triangulation is to determine the accuracy of the data, as opposed to seeking universal truth (Merriam, 1998). Member checking was used to reduce the effect of subjective bias (Patton, 2002). The researcher sent copies of the interview transcripts and themes that emerged to the participants by postal mail. Their acknowledgment of the accuracy of the transcripts and of the researchers' interpretations of the data ensured that trustworthiness was established (Merriam, 1998). Peer debriefing is a process of exposing oneself to a knowledgeable peer in a manner paralleling an analytic session, with the purpose of exploring aspects of inquiry that might remain only implicit in the inquirer's mind (Patton, 2002). For this study, two professional colleagues who had expertise in qualitative research agreed to serve as peer debriefers. They deemed the interpretations of the data to be accurate and representative of the participants' statements.

Data Analysis

A constant comparative method (Boeije, 2010) was used to interpret the data. The basic strategy of this analytical process is to compare pieces of data constantly. More specifically, each potentially meaningful piece of data in the interview transcripts was coded independently by the first and second authors, and the differences were discussed until agreement was reached. The demographic data and the master's program of study data were coded by the lead author and checked by the second author. The two peer debriefers reviewed the codes to avoid potential researcher bias. The researchers grouped the codes into thematic categories, and these were then refined into recurring themes (Boeije, 2010).

Results

Three interrelated themes emerged from the students' narratives. Explainable by the logic of the theory of transition (Schlossberg et al., 1995), the themes were (a) *difficulty in academic transition to a graduate program,* (b) *relationships with program faculty,* and (c) *experiential learning.*

Theme 1: Difficulty in Academic Transition to a Graduate Program

The students felt it was difficult to navigate the graduate entry transition in regard to academic success in the graduate program.

They believed their training should be designed to balance professional expectations as GAs or fellowship students and academic expectations as APE master's students. They felt anxiety and academic pressure in taking a new program of study. They faced transition challenges and constant concerns because they were required to complete their program of study within a short period (1 to 2 years).

The master's students who were interviewed prioritized their studies over their graduate assistantship or fellowship. They are required to maintain a minimum GPA of 3.0 in graduate school. In an APE graduate program, they need to pass all courses to be eligible to take the National Certification of Adapted Physical Educator (APENS) exam of the National Consortium for Physical Education for Individuals With Disabilities (NCPEID). As a future career requirement for fellowship recipients, all APE master's students must work with students with disabilities for 2 years in which 51% of the students have disabilities, or the equivalent (i.e., 25% for 4 years). These academic pressures adversely affected students' balancing of their studies and their assistantships or fellowships. For example, Cathy said,

> Every Saturday, as the fellowship requirement, students had to help disability sport events in the morning. Saturday is the one of important date for study. I have to finish my assignments for the following week. While I am in the duties of my fellowship, I start to think about my course assignments. I really struggle to balance duties of fellowship and coursework. I have hard time passing the courses. I also concern about passing APENS exams and getting the job that holds 50% of APE classes of my teaching assignments after the graduation. Otherwise, I need to pay them back. I am worried about my future. I know that Donovan and Jason are graduate students who have kids and family. It must be more difficult to balance fellowship, academics, and family. (Cathy, Interview)

Cathy explained that she prioritized her studies over her fellowship assignments because she faces three challenges: graduating from the APE program, passing the APENS exam, and getting a career. If she fails any one of these challenges, she will struggle to repay

her tuition to the federal grant agency. She felt these challenges are tough to overcome. APE master's students Donovan and Jason had time management problems related to completing multiple tasks, such as their fellowship duties, course assignments, and family duties. Donovan said, "I tried my best [at] managing the time to stay with my family while completing my assignments. It is not always enough." Jason said, "I have two children. . . . I am stressed. . . . I'm here . . . almost 15 hours working every day because I had to prepare and do the coursework and graduate assistant duty at the same time." He shared his challenges in handling his family, academic, and fellowship responsibilities:

> I have young child before my wife gave a birth. Even my son gets sick, I have to stay home and watch him, but my mind is about academic priority. I feel stressed when the assignments due dates are coming closer. I need to complete assignments, but family emergency is the unexpected event. Many professors knew about my situation, so they are dealing with family issues, so it has been parenting. They trust what I do. It is nice to see. It is tight, nice, and friendly group I am working with. I feel really challenging without any helps from my wife's partnership. I have to plan ahead. There are some students who just started field experiences in March. They can go to once a week, they do not have to worry about family. I do not have a choice like that. I have to go to twice a week and short periods of time, because I cannot stay longer. If I get a few days that my wife can take off, I go to field experiences. I take advantages of it. (Donovan, Interview)

Donovan felt stressed because he felt that if any of his responsibilities were not met satisfactorily, he might lose his fellowship or even be dismissed from the APE program. Therefore, he believed that support from his family members was a key factor in his success in this program.

Theme 2: Relationships With Program Faculty

Most participants were satisfied with the relationships they built with their program faculty, but others were not. Cathy, Donovan, Jason, Ted, and Nadia received their bachelor's degrees in physical

education at CSU, and they were satisfied to have their current advisors and program faculty because they were familiar with the faculty's expectations from their undergraduate programs. However, Tiffany and Aoife graduated from different programs and institutions. They had difficulty developing a positive relationship with their program faculty and difficulty in their transition from their undergraduate institutions. They believed that this occurred because they did not know about the program faculty's academic expectations and thus received lower grades for their coursework and because they encountered different expectations among the program faculty. Therefore, it was difficult for them to develop positive and trusting relationships with the APE faculty. For example, Aoife said,

> I was advised not to do a thesis for my master program, because it is too much work. Perhaps, professors recommend me say, I have to follow all requirements of the program of study, my former advisor told me that I have to take easy classes. It was unfortunate and struggling in exercise science courses. Professors concerned that I should not take any challenging courses like thesis courses in order to graduate. Some classes are much more demanding. I was struggling in the first semester. However, master students who graduated from CSU were recommended to complete thesis projects as a graduation requirement. I felt that I was not well prepared from my undergraduate institution, so that they underestimated my academic competency. I felt that that is different student treatment. I wanted to do thesis project, so I changed my academic advisor, but I need to understand politics and that is one of my transition problems at my graduate program of study. (Aoife, Interview)

Aoife also said that all professors control the environment of their own classrooms and have tremendous power over the types of relationships they form with their students. She believed that the power in student–professor relationships can make the relationships more problematic. If she does not follow professors' guidance, her graduate studies might become a nightmare. Tiffany also said, "I felt marginalized, detached, and isolated in the graduate program, because I was not familiar with the culture and did not know the fac-

ulty in their graduate programs." She felt that some faculty treated students with bachelor's degrees from different programs or universities differently. They were upset and unhappy because they felt they were treated as academically inferior to other students in the same program.

Theme 3: Experiential Learning

All the participants had chances to teach students with disabilities in the APE practicum. Cathy, Donovan, Jason, Ted, Nadia, Aoife, and Tiffany were assigned to complete 200 practicum hours at schools for children and adolescents with disabilities. As part of their practicum experiences, they learned about the academic backgrounds and social goals and objectives of the individualized educational plan (IEPs) with the cooperating teachers and paraeducators. It seems that teaching and consulting on APE classes helped them to teach and assist students with disabilities more effectively. When the cooperating teachers shared instructional and managerial tips, the participants were motivated to apply these tips for more appropriate practice. It surprised them and opened their eyes that there were many staff and teachers involved in APE class settings.

The participants had difficulty working with paraeducators because the paraeducators' roles and responsibilities were not clearly defined. They understood that *paraeducators* are an integral part of the learning and teaching team. Under the supervision of the teachers, paraeducators assist with multiple levels of support in physical education or APE. The participants felt that inadequate training and knowledge on the part of teachers prevented appropriate guidance for paraeducators to meet the educational needs of students with disabilities. However, the participants did not have the right to control the paraeducators. Nadia, for example, explained her situation as follows:

> I have a conflict that many paraeducators are not well educated. I would say that there is a lack of knowledge and there is another issue of shortage of paraeducator. I feel that my field experience does not flow well. There are many paraeducators who do not know any expectation from teachers before they come. I taught lessons and many paraeducators do not

> understand what I was saying. They start to chat with other paraeducators who are next to them. I said, "Excuse me . . . There are my students who are listening . . ." All of my students are on wheelchairs and none of them were worried and there was no communication between paraeducators and students with disabilities. I feel that there are some conflicts of professional interests between teachers, graduate students, and paraeducators. They need the session about how they interact with students with disabilities. (Nadia, Interview)

Jason also told of his negative experiences with his cooperating teacher. He believed he might need to develop behavioral management plans in relation to the paraeducators:

> Challenging is that I talk to cooperating teachers about this. They told me that I have to try to teach lessons effectively as much as possible. But I could not stand when I saw some paraeducators who act like babies, I think I have to develop behavioral management plans. The most important piece of this field experience is that paraeducators and teachers have to share ideas and collaborative actions toward meeting goals and objectives of students with disabilities. I know that paraeducators know more about students with disabilities, but they do not share the information with me. I feel that this is the issue in the field experiences. (Jason, Interview)

Jason explained that many paraeducators had behavioral issues because there is no clear definition of their responsibilities as administrative assistants or teacher's aides for students with disabilities. He also believed there is some miscommunication between the paraeducators and the participants. He said, "We need to have a template of communication items all paraeducators, cooperative teachers, and participants need to know." Ted described the experiential learning experiences with paraeducators as "learning how to deal with colleagues and teachers rather than teaching students with disabilities." He also commented, "It seems that I ignored voices of students with disabilities. I agree that APE teachers, administrators, and paraeducators made instructional decision, but it did not mean to reflect the needs of students with disabilities."

Discussion

The themes that emerged from this study were that these students struggled to overcome academic, assistantship, or fellowship challenges and stressors such as time demands and isolated status (Sato & Hodge, 2009). They believed that their transition to graduate school created academic shock, social isolation, and adjustment to a new academic culture. Although they had difficulty adjusting to their new programs, they attempted to cope with the transition by changing the meaning of the academic culture and managing their reactions to academic and professional transition stress. All of the students realized there is "no single, predictable, universal adult experience" (Schlossberg, 1987, p. 75). They agreed that their APE graduate programs help them acquire transferable skills and competencies (i.e., carry-forward or work-ready skill sets relevant to competing for future APE teaching positions; Rose, 2013).

This study found that master's students with a duel agenda (as graduate students and GA or fellowship recipients) might experience academic difficulties and time demands. Their assistantships and fellowships made them feel suspended between their undergraduate role and their new graduate role (Kotewa, 1995). According to the theory of transition (Schlossberg & Warren, 1985), new graduate students often feel inadequate and incompetent because of unknown situations and consequences. The students believed that they need to develop confidence in their academic achievements and assistantships or fellowships during a short period. Lofquist and Dawis (1991) explained that when graduate students develop harmonious relationships between faculty and their ability to adapt to the academic roles of their graduate programs, they can see the transition outcomes and the degree of fit, such as satisfaction, achievement, performance, stability, and retention. The students expressed a strong commitment to attending the APE program, but voiced less commitment to their assistantships or fellowship duties. They prioritized their academic progress because they were concerned about losing their assistantships or fellowships, which would lead to possible separation from the universities. One of the participants dropped out of the graduate program at the end of the academic year after losing her fellowship and failing to maintain her academic standing.

The participants who graduated from other undergraduate programs or institutions (Tiffany and Aoife) shared their social transition experiences in being treated differently by professors in their academic major programs. Faculty–student mentoring relationships provide valuable insights into effective practices that foster the success of graduate students. However, the participants had difficulty finding suitable mentors who could provide proper academic and social support. In this study, for example, one professor discouraged Aoife from completing the thesis option as a graduation requirement of the APE master program. Schlossberg (1987) explained that a sense of belonging must be inclusive, but when graduate students make larger scale transitions (e.g., changing academic programs or institutions), they have a hard time shifting from their role as undergraduate students to their new role as graduate students. Graduate students need to feel that they matter and that they should be the subject of another person's interest. According to Lechuga (2011), reciprocity is a key component of faculty–graduate student relationships in that students receive direction from faculty and faculty members benefit by learning from their students. Aoife found that the professor encouraged other graduate students with a physical education degree from the same undergraduate programs to take the thesis option. Lechuga explained two factors behind faculty–graduate student relationships. First, faculty tend to seek graduate students who demonstrate their ability to work and understand the academic culture of graduate programs. Second, faculty increase their level of productivity by working with "high quality" graduate students who are able to work independently with minimal direction.

The graduate students had valuable teaching and field experiences working with students with disabilities at practicum sites. They worked hard to meet cooperating teachers' expectations. All graduate students were motivated to comply with the instructor's authority and expectations, which they described as social pressure that encouraged them to resolve the challenges. This study found a lack of clarity in relation to paraeducators' roles and responsibilities in APE classes. More specifically, the graduate students believed that many paraeducators did not view APE classes as important academic subjects. They felt that the paraeducators considered APE classes as a relaxed time when they did not have to deal with students with

disabilities, so they stepped back from the students with disabilities (Bryan, McCubbin, & van der Mars, 2013). Therefore, some graduate students had to manage the behavior of students with disabilities and of the paraeducators at the same time. All the graduate students recommended adequate training and clarification of the roles and responsibilities of paraeducators, such as connector, team member, instructor, and caregiver/health service, as this would help all teachers, paraeducators, and graduate students learn appropriate guidance to meet the education needs of students with disabilities in APE classes (Bryan et al., 2013; Downing, Ryndak, & Clark, 2000).

Recommendations and Conclusion

These graduate students struggled to overcome challenges related to their studies, assistantship, or fellowship, as well as stressors such as time demands and isolation (Sato & Hodge, 2009). Although they had difficulty adjusting to graduate school, they tried to learn how to cope in a particular APE graduate program. Below are recommendations that will help support their academic transition.

First, faculty members involved in APE graduate programs should receive cultural awareness training (e.g., in transition issues such as how to handle a duel agenda or academic transfer policies) to help them better understand graduate students' unique challenges (Sato et al., 2011).

Second, college and university faculty and administrators need to become more aware of the growing enrollment of diverse students on U.S. campuses and become more sensitive to the needs of these academic and social sojourners (Sato & Hodge, 2009). In collaboration with offices of international affairs, academic units need to sponsor mandatory events on cultural, social, and academic adjustment and seminars to address issues concerning international students' academic and social experiences, discrimination, marginalization, diversity, and internationalism. It is also important to institutionalize a commitment to student diversity (including internationalism), and colleges and universities should include in the promotion and tenure process an evaluation of faculty activities associated with promoting such diversity. This type of accountability measure would encourage faculty to engage more regularly in activities supportive of diversity, which might lead to a heightened awareness of the kinds of issues presented in this paper (Hodge & Wiggins, 2010).

Third, all graduate students should complete multiple early practicum experiences instructing in APE settings and pay special attention to the rehabilitation and educational purposes of paraeducators. Chow (2002) identified progressive ways to help students by using different collaborative approaches (part-methods, guided practice, and modified games and play). Therapeutic techniques (e.g., students' kinesthetic senses) supported by paraeducators must also be covered within APE programs. Graduate students acquire proper skills and tactics in APE settings.

Last, graduate students should be encouraged to document their sources of transition stress and their coping responses through journaling techniques. These techniques might enhance self-awareness of students' thoughts and feelings in specific work contexts (Reed & Giacobbi, 2004). Hill (2001) stated that self-awareness is a critical first step toward identifying specific situations that elicit stress-related emotions in the graduate transition. This awareness allows graduate students to develop problem-solving techniques.

To better support APE graduate students, we encourage academic departments, administrators, faculty, and all students to learn to view themselves as playing various roles such as academic advisor, graduate student, GA, or fellowship recipient. It might be wise for graduate programs and graduate students to focus on the nuances of academic and social relationships from the outset.

References

Boeije, H. R. (2010). *Analysis in qualitative research*. London, England: Sage.

Bryan, R. R., McCubbin, J. A., & van der Mars, H. (2013). The ambiguous role of the paraeducator in the general physical education environment. *Adapted Physical Activity Quarterly, 29,* 164–183. https://doi.org/10.1123/apaq.30.2.164

Chow, E. W. (2002). Re-thinking the trainee experience for preservice physical education teacher education. *Asia-Pacific Journal of Teacher Education & Development, 5,* 121–134.

Downing, J., Ryndak, D., & Clark, D. (2000). Paraeducators in inclusive classrooms. *Remedial and Special Education, 2,* 171–181. https://doi.org/10.1177/074193250002100308

Ellery, P. J., & Stewart, M. J. (2000). Graduate adapted physical education personnel preparation programs receiving federal funding. *Adapted Physical Activity Quarterly, 17,* 54–68. https://doi.org/10.1123/apaq.17.1.54

Evans, N. J., Forney, D. S., Guido, F. M., Patton, L. D., & Renn, K. A. (2010). *Student development in college: Theory, research, and practice* (2nd ed.). San Francisco, CA: Jossey-Bass.

Ferrales, G., & Fine, G. A. (2005). Sociology as a vocation: Reputations and group cultures in graduate school. *The American Sociologist, 36*(2), 57–75. https://doi.org/10.1007/s12108-005-1005-1

Hill, K. L. (2001). *Frameworks for sport psychologists: Enhancing sport performance.* Champaign, IL: Human Kinetics.

Hodge, S. R., & Wiggins, D. K. (2010). The African American experience in physical education and kinesiology: Plight, pitfalls, and possibilities. *Quest, 62,* 35–60. https://doi.org/10.1080/00336297.2010.10483631

Johnston, T. C. (2010). Who and what influences choice of university? Student and university perceptions. *American Journal of Business Education, 3*(10). https://doi.org/10.19030/ajbe.v3i10.484

Kallio, R. E. (1995). Factors influencing the college choice decisions of graduate students. *Research in Higher Education, 36*(1), 109–124. https://doi.org/10.1007/BF02207769

Kotewa, D. (1995). Transitions and adaptations: Theory and thoughts to ponder. *Journal of Student Affairs, 4,* 45–52.

Kretchmar, J., & Memory, A. (2010). One college's journey into the unconscious mind of its prospective students: How a new research methodology is helping us recruit. *Journal of College Admission, 207,* 8–15.

Lechuga, V. M. (2011). Faculty–graduate student mentoring relationships: Mentors' perceived roles and responsibilities. *Higher Education, 62,* 757–771. https://doi.org/10.1007/s10734-011-9416-0

Lewis, C., Ginsberg, R., Davis, T., & Smith, K. (2004). The experiences of African American PH.D students at a predominantly White Carnegie I-research institution. *College Student Journal, 38,* 231–245.

Lofquist, L. H., & Dawis, R. V. (1991). *Essentials of person–environment–correspondence counseling.* Minneapolis: University of Minnesota Press.

McCoy, D. L. (2014). A phenomenological approach to understanding first-generation college students of color transition to one "extreme" predominantly White institution. *College Student Affairs Journal, 32*(1), 155–169.

Merriam, S. B. (1998). *Qualitative research and case study applications in education.* San Francisco, CA: Jossey-Bass.

Patton, M. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.

Polson, C. J. (2003). Adult graduate students challenge institutions to change. *New Directions for Student Services, 2003*(102), 59–68. https://doi.org/10.1002/ss.90

Reed, S., & Giacobbi, P. R., Jr. (2004). The stress and coping responses of certified graduate athletic training students. *Journal of Athletic Training, 39,* 193–200.

Rose, M. (2013). Preparing for life "beyond academe": Professional skills development for graduate students in Canadian universities. *English Studies in Canada, 39*(4), 4–8. https://doi.org/10.1353/esc.2013.0041

Samuel, E. (2004). Racism in peer-group interactions: South Asian students' experiences in Canadian academe. *Journal of College Student Development, 45,* 407–424. https://doi.org/10.1353/csd.2004.0053

Sato, T., & Hodge, S. R. (2009). Asian international doctoral students' experiences at two American universities: Assimilation, accommodation, and resistance. *Journal of Diversity in Higher Education, 2*(3), 136–148. https://doi.org/10.1037/a0015912

Sato, T., Hodge, S. R., & Burge-Hall, V. (2011). International student-athletes' academic, athletic, and social experiences at a historically Black university in America. *Journal for the Study of Sports and Athletes in Education, 5*(1), 45–71. https://doi.org/10.1179/ssa.2011.5.1.45

Schlossberg, N. K. (1987). Taking the mystery out of change. *Psychology Today, 21,* 74–75.

Schlossberg, N. K., Lynch, A. Q., & Chickering, A. W. (1989). *Improving higher education environments for adults: Responsive programs and services from entry to departure.* San Francisco, CA: Jossey-Bass.

Schlossberg, N. K., & Warren, B. (1985). Growing up adult: Reactions to nontraditional learning experiences. In L. V. Moore (Ed.), *Evolving theoretical perspectives on students* (p. 45). San Francisco, CA: Jossey-Bass.

Schlossberg, N. K., Waters, E. B., & Goodman, J. (1985). *Counseling adults in transition: Linking practice with theory.* New York, NY: Springer.

Spurling, N. (2006). Exploring adjustment: The social situation of Chinese students in UK higher education. *Learning and Teaching in the Social Sciences, 3,* 95–117.

Yin, R. K. (2003). *Case study research design and methods* (3rd ed.). Thousand Oaks, CA: Sage.

The Physical Educator Vol. 73 • pp. 639–651 • 2016
https://doi.org/10.18666/TPE-2016-V73-I4-6883

MOTOR LEARNING

Does Varying Attentional Focus Affect Skill Acquisition in Children? A Comparison of Internal and External Focus Instructions and Feedback

Charles Agar, Charlotte A. Humphries, Millie Naquin, Edward Hebert, Ralph Wood

Abstract

Recently, researchers have concluded that motor skill performance is enhanced when learners adopt an external attentional focus, compared to adopting an internal focus. We extended the line of inquiry to children and examined if skill learning in children was differentially affected by providing instructions and feedback that direct attentional focus internally versus externally and if the effect of attentional focus varied between younger and older children. Forty-eight children in two age groups (5–8 years old and 9–12 years old) were randomly assigned to either an internal attentional focus group or an external attentional focus group. Participants completed three 10-trial acquisition blocks of a shuffleboard accuracy task, followed by retention and transfer tests. There was no significant difference between internal and external focus groups, though older children performed significantly better than

Charles Agar is an itinerant physical educator, St. Tammany Parish Schools, Covington, Louisiana. Charlotte A. Humphries is an associate professor, Kinesiology and Health Studies, Southeastern Louisiana University. Millie Naquin is a professor, Kinesiology and Health Studies, Southeastern Louisiana University. Edward Hebert a professor, Kinesiology and Health Studies, Southeastern Louisiana University. Ralph Wood is a professor, Kinesiology and Health Studies, Southeastern Louisiana University. Please send author correspondence to charles.agar@stpsb.org

younger ones did, and all groups improved with practice. These results suggest that skill learning in children improves with task-based instruction and practice, regardless of the direction of attentional focus. More research is needed on children and attentional focus to determine whether they, and possibly other beginners, learn better with an internal or external focus of attention.

Since the 1990s, researchers have completed a great deal of basic and applied skill acquisition research on the effects of specific types of attentional focus instructions. Many of these researchers have directed attentional focus using instructions and feedback and have compared the effects of directing learners to adopt an internal versus an external focus. Led by the work of Wulf and colleagues (e.g., Wulf, 1998, 2013; Wulf, Granados, & Dufek, 2007; Wulf, Höb, & Prinz, 1998; Wulf & Jiang, 2007; Wulf, Lauterbach, & Toole, 1999; Wulf, McConnel, Gartner, & Schwarz, 2002; Wulf, Waechter, & Wortmann, 2003), the majority of studies suggest that a learner's attention should be directed toward the item being manipulated by his or her body (external attentional focus) instead of toward bodily movements (internal attentional focus). For example, Wulf et al. (1999) found that college students learning a golf shot improved more if they focused their attention more on the path of the golf club (external) than on the movement of their arms (internal). A recent meta-analysis of this research (Tan, Lai, & Huang, 2012) supported the conclusion. The meta-analysis covered 57 published and unpublished studies. Of these, 74.6% found that skill acquisition was enhanced by an external compared to an internal attentional focus, with an average effect size of 0.617.

However, not all researchers have found the external focus advantage. Some found that performance was better with internal focus, particularly for new or novel tasks or for beginners or low-skilled learners. For example, less experienced participants benefited from internal attentional focus in skills such as golf (Black, 2004; Perkins-Ceccato, Passmore, & Lee, 2003) and soccer skills (Beilock, Carr, MacMahon, & Starkes, 2002; Perkins-Ceccato et al., 2003), dart throwing (Emanuel, Jarus, & Bart, 2008; Williams, 2009), and batting (Castaneda & Gray, 2007; Gray, 2004). Therefore, it is possible that during the early stages of skill acquisition, when learners are getting a basic understanding of an effective movement pattern, that

directing their attention to the correct movement pattern (internal focus) is more beneficial. Then, once an effective movement pattern has been developed, the benefits of an external focus of attention can be realized.

Attentional Focus and Children

Skill acquisition researchers who have examined the internal versus external attentional focus question have almost exclusively used adults as participants. Whether the external attentional focus advantage applies to children has yet to be explored conclusively. There are two reasons not to assume that research findings generated from adult learners apply to children. First, children deal with information differently, causing them to learn differently from adults and adolescents (Yan, Thomas, Stelmach, & Thomas, 2000). In addition, children are novices at most skills.

We were able to locate only two published studies (Emanuel et al., 2008; Saemi, Porter, Wulf, Ghotbi-Varzaneh, & Bakhtiari, 2013) comparing the effects of internal versus external focus on skill learning in children and one abstract (Thorpe, Daniel, & Hunter, 2001). Thorpe et al. and Emanuel et al. found trends suggesting skill learning was better when using an internal focus, and Saemi et al. found better performance with external focus. Three studies on children cannot be considered definitive, but they do suggest a line of inquiry.

Emanuel et al. (2008) studied dart throwing with children (8–9 years old) and adults (22–36 years old), having them practice with either internal or external focus instructions. During acquisition and retention, adults performed the task better than the children, with no overall advantage for external or internal focus. However, performance was slightly higher in the adults who adopted an external focus, but the data were in the opposite direction for children; children performed somewhat better, though not significantly, when given internal focus instructions.

Saemi et al. (2013) had children throw tennis balls using their dominant arm at a target; their results showed a significant performance advantage for the external focus group. It may be important that Saemi et al. used a presumably familiar task (throwing) and Emanuel et al. (2008) used a novel task. This could suggest that beginning learners and/or novel tasks are exceptions to the external-is-better conclusion.

Numerous studies have shown that an external attentional focus enhances skill learning more than internal attentional focus does. However, adult participants have been used in most of this research, and there is some evidence that an internal focus may be advantageous for children or beginners. Therefore, we sought to extend this research by comparing the effects of internal and external focus instructions and feedback on children learning a novel, but realistic, motor skill and by comparing the effects in younger and older children.

Method

Participants

Forty-eight 5- to 12-year-olds with no known physical or intellectual deficits were recruited from a public elementary school's after-school program. Younger (5–8 years old) and older (9–12 years old) children were randomly assigned to an internal attentional focus group (IAF) or an external attentional focus group (EAF). All participants were unfamiliar with the task (shuffleboard). University institutional review board (IRB) approval was obtained before the study, the children's parents provided informed consent, and the children gave written assent.

Apparatus and Task

The task was using a shuffleboard stick to shoot pucks along a 5-ft-wide lane toward a target placed 10 ft from the starting line (Figure 1). Pilot testing indicated that this distance was far enough to challenge 5- to 12-year-olds, but not so far that they were likely to shoot recklessly or struggle to generate enough force. The target was a 1-ft × 5-ft rectangle, with additional lines placed 1 ft and 2 ft in front of and behind it. A shot stopping in the target area scored 3 points, 2 points if the puck was within 1 ft of the target, 1 point if the puck was within 2 ft of the target, and 0 points if it went wide or stopped more than 2 ft from the target.

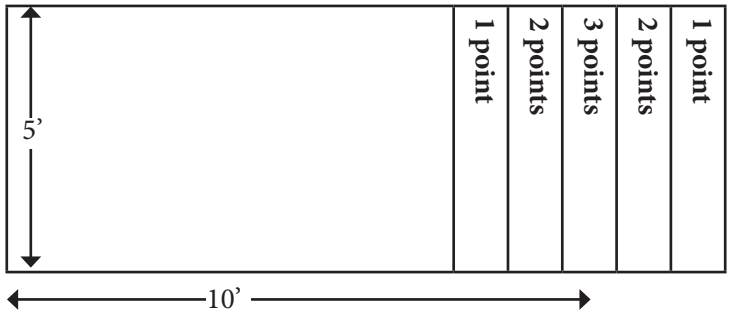

Figure 1. Diagram of shuffle target.

Procedure

The study was performed in a large, quiet room. On the first day, each participant was given a demonstration and explanation of the task and then performed three blocks of 10 acquisition trials (30 shots total), with feedback after each trial. The children returned in 1–2 days to perform 11 retention and 10 transfer shots. The first of the 11 retention trials served as a warm-up and was not counted in analysis. Following the retention phase, the children performed one block (10 shots) using their opposite hand as a transfer task. No instructions on how to do the task or feedback were given on the second day.

Explanation and Demonstration

Before acquisition trials, the researcher demonstrated the task to each participant, and provided this brief explanation: "The goal is to make the puck stop in the center of the target to score as many points as possible. The closer to the center of the target, the more points you get. Remember to keep your body behind the line. In order to score, the puck must stop on the target." Subsequent instructions and feedback directed subjects' attention to internal or external aspects of the task.

EAF group. Instructions, cues, and feedback provided to the children assigned to the EAF group were directed at the target, puck, shuffleboard stick, and the puck's course. For example, the learner's attention was directed to using the stick to propel the puck in the

desired direction or with appropriate force. Typical feedback examples included "The stick needs to push the puck faster" or "The stick needs to push the puck slower."

IAF group. Instructions, cues, and feedback given to participants in the internal condition were directed toward the bodily actions used to perform the task. Instructions were focused on body position, movements of the shoulder, stepping of the foot, pushing of the arm, and position of fingers (grip). Feedback was consistent with internal attentional focus, such as "Step harder," "Swing your arm faster," or "Step and push your arm toward the center" [if shot was wide].

Data Analyses

The dependent measure was the accuracy score. Scores were divided into blocks of 10 trials, creating three acquisition blocks, one retention block, and one transfer block. Scores were also divided into two age groups, younger children and older children, for analysis. A $2 \times 2 \times 3$ (Age × Condition × Blocks) ANOVA, with repeated measures on blocks, was used to examine acquisition scores. A 2×2 (Age × Condition) ANOVA was used to analyze retention and transfer.

Results

Overall, the results showed significant differences attributable only to age and practice; there was no significant difference between internal and external focus groups. All groups improved regardless of focus, with the older children performing significantly better than the younger children. Average scores for each group during acquisition, retention, and transfer are presented in Table 1 and Figure 2.

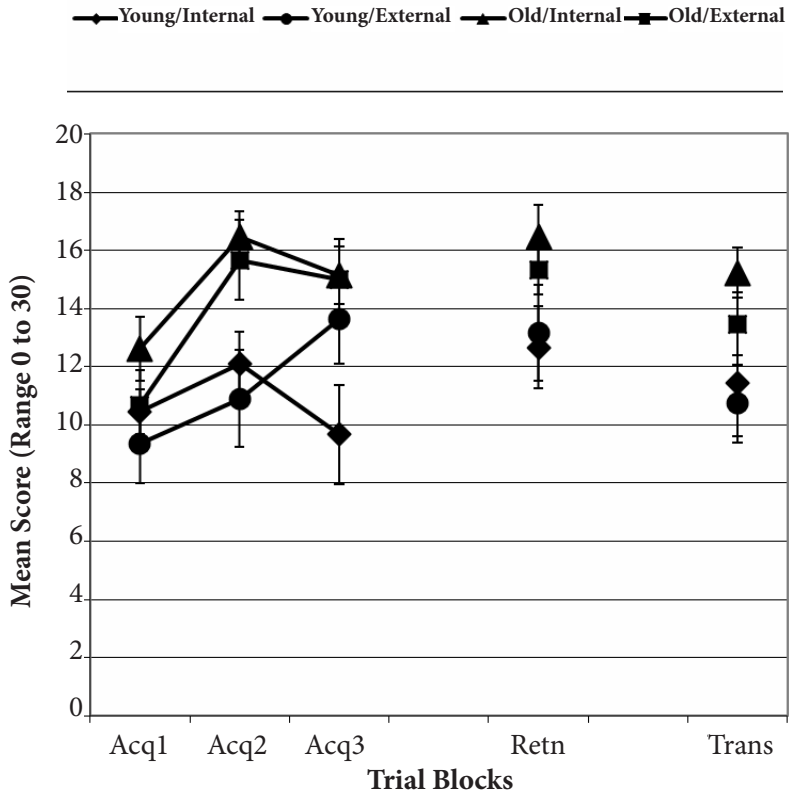

Figure 2. Comparison of means and standard errors for all groups.

Table 1
Shuffleboard Scores of Treatment Groups During Acquisition, Retention, and Transfer Blocks

Trial block	Groups	*M*	*SD*	*SEM*
Acquisition 1	OEAF	10.67	4.776	1.233
	OIAF	12.62	4.194	1.163
	YEAF	9.36	4.523	1.364
	YIAF	10.44	2.297	.766

Table 1 (cont.)

Trial block	Groups	*M*	*SD*	*SEM*
Acquisition 2	OEAF	15.67	5.314	1.372
	OIAF	16.46	3.126	.867
	YEAF	10.91	5.540	1.670
	YIAF	12.11	3.296	1.099
Acquisition 3	OEAF	15.00	5.593	1.444
	OIAF	15.15	3.602	.999
	YEAF	13.64	5.065	1.527
	YIAF	9.67	5.244	1.748
Retention	OEAF	15.33	3.244	.838
	OIAF	16.46	3.971	1.101
	YEAF	13.18	5.474	1.650
	YIAF	12.67	4.213	1.404
Transfer	OEAF	13.47	4.190	1.082
	OIAF	15.23	3.086	.856
	YEAF	10.73	4.474	1.349
	YIAF	11.44	5.503	1.834

Note. OEAF = older participants, external attentional focus; OEAF = older participants, internal attentional focus; YEAF = younger participants, external attentional focus; YEAF = younger participants, internal attentional focus.

Analysis of acquisition data revealed a significant effect for age, $F(1, 44) = 15.88$, $p < 0.001$. The older children (9–12 years old) had significantly higher scores than the younger children (5–8 years old). The blocks effect was also significant, $F(2, 88) = 6.22$, $p < .05$, indicating improvement in scores during acquisition.

Analysis of retention and transfer data also yielded a significant effect for age, $F(1, 44) = 6.76$, $p < .05$, with older children outperforming younger children. No other effects were significant. There was a nonsignificant trend in transfer of internal-focus subjects performing better than external-focus subjects (Figure 2).

Discussion

The effect of having learners adopt an internal versus an external focus has been examined frequently, with a general conclusion reached that adopting an external focus enhances motor performance. However, the extent to which this conclusion applies to children has yet to be determined. In this study, we examined the effect of providing children learning a motor skill (shuffleboard) with instructions and feedback that focused their attention externally (on the stick and puck) or internally (on the body actions produced). The results indicated that children learning this task improved, but performance was not differentially affected by the internal versus external focus.

This study had two research questions. First, would children learn new skills (earn more points in a shuffleboard task) more effectively with an external focus (focusing on the shuffleboard stick and puck) or an internal focus (focusing on arm and body movement)? Second, is there a difference in the advantage of one attentional focus over another as a function of age? We found older children consistently performed better than the younger participants, but we found no significant difference between internal and external focus group performance during acquisition, retention, or transfer.

Our review of previous research indicated that most studies support using an external focus regardless of experience or task. However, a few studies have suggested that an internal focus may be better if participants are novices, are using a nondominant body part, or are children.

Most studies comparing internal versus external attentional focus have suggested that using an external focus is more beneficial than using an internal focus, but this study and a few others (Black, 2004; Emanuel et al., 2008) suggest that there may be exceptions. There is evidence that beginners in the early stages of learning may find it advantageous to use an internal focus. Our data indicate that children may significantly improve at a new skill regardless of attentional focus when provided task-related instructions and feedback and given opportunities to practice.

Older children may have performed better than the younger children because of physical growth and biomechanical and physiological factors (Yan et al., 2000). Cognitive development may also

play a role in explaining our finding of no advantage of one attentional focus over another. As children mature, they become better at creating strategies to handle information (Yan et al., 2000). Thus, to benefit from attention-focusing instruction and feedback, learners must attend to, process, and implement information provided and consciously adopt an internal or external attentional focus. It is logical that developmental cognitive differences in children and adults mediate the effects of such attention-focusing direction.

Motivation is always a concern when having children do skill practice. During the third acquisition block, all but the younger external attentional focus group regressed, though not significantly, in performance. The participants likely started to lose interest in the task. Participants rushed through their shots and focused less on their shuffling. When these participants returned 1–2 days later for retention and transfer, their interest in the task was restored and their performance improved.

The results of this study suggest that further examination of the effects of using internal and external attentional focus when designing instruction for children learning motor skills is needed. Researchers might compare novice and skilled children and adults, to examine whether any differences between children and adults stem from developmental abilities or from children's general lack of skills. Additionally, researchers may extend this line of inquiry by including treatment groups who received instructions and feedback that combine internal and external focus.

The findings of this study, as well as those previously conducted, have implications for physical educators. An important aspect of learning and performing motor skills involves effectively directing a person's attention (Magill & Anderson, 2014), and instructors rely on this attentional process when they provide verbal instructions and feedback. A physical education teacher, for example, may say to a learner, "Concentrate on keeping your shoulders back," which provides attention-focusing instructions for practice. Similarly, after observing a student perform a task, he or she provides feedback that directs the learner's attention on one or more aspects of the task to modify. The benefits of providing verbal instructions and feedback have been well established as integral to skill learning, and guidelines for providing effective instructions and feedback are informed

by decades of research (e.g., Magill, 1994; Wulf, Shea, & Lewthwaite, 2010).

Within the context of this study, researchers have examined whether instructions and feedback should direct learners' attention intrinsically or extrinsically and primarily support an external focus. However, the majority supporting this conclusion have examined skill learning in college-aged learners, and some researchers have suggested that an internal focus may be better if learners are beginners (Castaneda & Gray, 2007; Perkins-Ceccato et al., 2003) or are children (Emanuel et al., 2008; Thorpe et al., 2001). It has also been recognized (Wulf & Shea, 2002) that conclusions derived from laboratory-based motor learning research may not always apply to applied contexts. Thus, the guideline of providing instructions and feedback using an external focus may not apply to the elementary or middle school physical education context. The results of this study add to the existent literature guiding effective teaching and suggest that instructions and feedback that focus attention internally or externally are equally effective for young learners. Further research examining whether this holds true for different types of tasks and different stages of learning would be appropriate.

References

Beilock, S. L., Carr, T. H., MacMahon, C., & Starkes, J. L. (2002). When paying attention becomes counterproductive: Impact of divided versus skill-focused attention on novice and experienced performance of sensorimotor skills. *Journal of Experimental Psychology: Applied, 8,* 6–16. https://doi.org/10.1037/1076-898x.8.1.6

Black, C. (2004). Internal focus of attention is superior to external focus when training is extended to several weeks. *Journal of Sport & Exercise Psychology, 26,* S35.

Castaneda, B., & Gray, R. (2007). Effects of focus of attention on baseball batting performance in players of differing skill levels. *Journal of Sport & Exercise Psychology, 29,* 60–77. https://doi.org/10.1123/jsep.29.1.60

Emanuel, M., Jarus, T., & Bart, O. (2008). Effect of focus of attention and age on motor acquisition, retention, and transfer: A randomized trial. *Physical Therapy, 88,* 251–260. https://doi.org/10.2522/ptj.20060174

Gray, R. (2004). Attending to the execution of a complex sensorimotor skill: Expertise differences, choking, and slumps. *Journal of Applied Experimental Psychology, 10,* 42–54. https://doi.org/10.1037/1076-898X.10.1.42

Magill, R. A. (1994). The influence of augmented feedback on skill learning depends on characteristics of the skill and the learner. *Quest, 46,* 314–327. https://doi.org/10.1080/00336297.1994.10484129

Magill, R., & Anderson, D. (2014). *Motor learning and control: Concepts and applications.* New York, NY: McGraw-Hill.

Perkins-Ceccato, N., Passmore, S., & Lee, T. (2003). Effects of focus of attention depend on golfers' skill. *Journal of Sport Sciences, 21,* 593–600. https://doi.org/10.1080/0264041031000101980

Saemi, E., Porter, J., Wulf, G., Ghotbi-Varzaneh, A., & Bakhtiari S. (2013). Adopting an external focus of attention facilitates motor learning in children with attention deficit hyperactivity disorder. *Kinesiology, 45,* 155–165.

Tan, J., Lai, Q., & Huang, Z. (2012). A meta-analysis on the effects of attentional focus on motor learning. *Journal of Beijing University of Physical Education, 35*(4), 80–87, 110.

Thorpe, D. E., Daniel, P., & Hunter, K. (2001) The differential effects of internal versus external focus of attention on the learning of a novel motor task in children. *Journal of Sport & Exercise Psychology, 23,* 59–60.

Williams, B. (2009). A*n examination of motor learning, affect, and arousal while utilizing an external versus internal attentional focus during dart throwing* (Unpublished master's thesis). Southeastern Louisiana University, Hammond.

Wulf, G. (1998). Frequent feedback enhances complex motor skill learning. *Journal of Motor Behavior, 30,* 180. https://doi.org/10.1080/00222899809601335

Wulf, G. (2013). Attentional focus and motor learning: A review of 15 years. *International Review of Sport and Exercise Psychology, 6,* 77–104. https://doi.org/10.1080/1750984X.2012.723728

Wulf, G., Granados, C., & Dufek, J. (2007). Increases in jump-and-reach height through an external focus of attention. *Journal of Sport & Exercise Psychology, 29,* S141–S142. https://doi.org/10.1260/174795407782233182

Wulf, G., Höb, M., & Prinz, W. (1998). Instructions for motor learning: Differential effects of internal versus external focus of attention. *Journal of Motor Behavior, 30,* 169–179. https://doi.org/10.1080/00222899809601334

Wulf, G., & Jiang, S. (2007). An external focus of attention enhances golf shot accuracy in beginners and experts. *Research Quarterly for Exercise and Sport, 78,* 384–389. https://doi.org/10.1080/02701367.2007.10599436

Wulf, G., Lauterbach, B., & Toole, T. (1999). The learning advantages of an external focus of attention in golf. *Research Quarterly for Exercise and Sport, 70,* 120–126. https://doi.org/10.1080/02701367.1999.10608029

Wulf, G., McConnel, N., Gartner, M., & Schwarz, A. (2002). Enhancing the learning of sport skills through external-focus feedback. *Journal of Motor Behavior, 34,* 171. https://doi.org/10.1080/00222890209601939

Wulf, G., & Shea, C. H. (2002). Principles derived from the study of simple skills do not generalize to complex skill learning. *Psychonomic Bulletin & Review, 9,* 185–211. https://doi.org/10.3758/BF03196276

Wulf, G., Shea, C., & Lewthwaite, R. (2010). Motor skill learning and performance: A review of influential factors. *Medical Education, 44*(1), 75–84. https://doi.org/10.1111/j.1365-2923.2009.03421.x

Wulf, G., Waechter, S., & Wortmann, S. (2003). Attentional focus in motor skill learning: Do females benefit from an external focus? *Women in Sport and Physical Activity Journal, 12,* 37–52. https://doi.org/10.1123/wspaj.12.1.37

Yan, J. H., Thomas, J. R., Stelmach, G. E., & Thomas, K. T. (2000). Developmental features of rapid aiming arm movements across the lifespan. *Journal of Motor Behavior, 32,* 121–140. https://doi.org/10.1080/00222890009601365

The Physical Educator Vol. 73 • pp. 652–670 • 2016
https://doi.org/10.18666/TPE-2016-V73-I4-7069

PEDAGOGY

Concerns of the Novice Physical Education Teacher

Evelyn J. Gordon

Abstract

The purpose of this case study was to examine novice physical education teachers in the first and second year of teaching. Participants included two novice physical education teachers, John in Year 1 and Mark in Year 2. Methodology included observations, semistructured interviews, and documents. Data were analyzed using open coding and constant comparison methods. The two themes that emerged from the analysis included teacher development and concerns with classroom management, procedures, and safety. Using Fuller's (1969) classification of new teacher concerns, the participants exhibited "self-concerns" and "student concerns." Although both the participants in the study displayed similar concerns as other classroom teachers (e.g., classroom management, procedures, and safety), there were differences in how these concerns were implemented.

For new teachers, the transition from student to teacher and the unknown of their new roles and academic workplace may cause anxiety. Richards, Templin, and Graber (2014) provided evidence that this transition may be more difficult for physical education teachers than for teachers in general education. These factors may cause these new teachers to leave the profession. The study of novice teachers and the transition from student to teacher can be an important tool

Evelyn Gordon is assistant professor, School of Kinesiology, Sports and Coaching Education, University of Southern Mississippi. Please send author correspondence to evelyn.gordon@usm.edu

in the retention of these new professionals. Retention has been an area of concern. Ingersoll (2012) stated that first year teacher attrition rates are almost at 33%. Ingersoll (2003) previously noted that 46% of teachers will leave within 5 years, but new data point toward a downward trend with 17% (Gray & Taie, 2015) leaving within 5 years.

Novice teachers may feel overwhelmed, which can be associated to the environment of the school. These school environments may include poor support from administration and parents and difficult teaching assignments, classroom management, and lesson planning. Even though novice teachers have been trained either through a teacher education program or an alternative certification process, concerns about the uncertainties in the new environment arise. Concerns include content knowledge, classroom management, expectations, pedagogical skills, relationships, student learning, planning, and evaluations (Mawer, 2014, p. 12). These concerns can be categorized into task conflict, process conflict, and relationship conflicts (Khan, Yusoff, & Khan, 2014).

The literature addresses the environment new teachers will enter as well as the lack of clearly defined roles of new teachers, classroom management issues, content knowledge, and new teacher support (Kahn et al., 2014). If these issues are not addressed, it could produce feelings such as anxiety and stress and in turn could lead to novice teacher attrition (Aloe, Amo, & Shanahan, 2014).

Literature Review

Identities Development and Role Demands

Fuller (1969) conceptualized a three-phase model of teacher development. The first phase he categorized as a pre-teaching phase, from the initial student interaction up to experience in the classroom. The second phase, the early teaching phase or self-concerns, is characterized by new teachers entering the field and asking questions about support, both emotional and procedural, and job expectations. The third phase, late concerns or student concerns, is focused on the student. Student concerns include learning, knowing students' abilities, and evaluating student performance. Fuller and Brown (1975) reevaluated the three-phase model and revised it to include survival concerns, teaching situation concerns, and pupil

concerns (Marshall, 1998). Survival concerns include controlling student behavior and meeting the approval of not only the students but also other faculty and administration. Teaching concerns include class size and the lack of time and materials (Marshall, 1998). Pupil concerns are focused on the intellectual, emotional, and social needs of the student (Marshall, 1998).

According to Pigge and Marso (1997), as novice teachers continue teaching, concerns of teaching and student concerns increase and self-concerns decrease. These results support Fuller's theory. Conway and Clark (2003) noted the same phenomenon when examining participants completing teaching internships. They noted that not only did teaching concerns transition, but, as Conway and Clark (2003) explained, that a reflective approach to teaching also occurred—a reflective approach that decreased outward attention to organization and procedures and increased inward attention in the desire to become a better teacher.

The uncertainty of expectations may contribute to novice teachers' anxiety. Schempp, Sparks, and Templin (1993) addressed the role demands that novice teachers may encounter. Role demands fell into two categories: explicit and implicit. Explicit role demands include classroom management and procedures, and implicit demands include pedagogy techniques or learning strategies. Schempp et al. pointed out that the explicit demands were not clear until one had differing opinions and ideas, such as a new teacher allowing students to chew gum in class.

Classroom Management

Classroom management and procedures are a big concern (Chesley & Jordan, 2012; Fuller, 1969; Schempp et al., 1993; Tsangaridou & Polemitou, 2015). According to Stough and Montague (2015) content has taken precedence over the emphasis of classroom management. Most teachers agree that classroom management should be the highest priority, especially with explicit role demands (Schempp et al., 1993). Classroom management, or teacher authority, is ingrained into the hierarchical structure of education. Classroom management is essential to gain the respect of veteran teachers. New teachers in this study found that being authoritative "provided little satisfaction" (Schempp et al., 1993, p. 459). Being a good classroom

manager was important to the new teachers because it predestined them as being professional and competent, which in turn had a huge effect on student control. Tsangaridou and Polemitou (2015) reported similar responses to those of Schempp et al. (1993) concerning classroom management. Tsangaridou and Polemitou found that novice teachers had concerns in the areas of classroom management and classroom procedures. Participants stressed that classroom management was vital for effective teaching. Many novice teachers reported that they did not fully comprehend the concepts of classroom management theories and practices during teacher preparation (Chesley & Jordan, 2012). Stough and Montague suggested that the reason may be that classroom management content is difficult to work into the pedagogical course curriculum when the main focus is on content information in specific teaching areas. Stough and Montague also stressed that when classroom management is taught, the programs stress "whole class" (p.448) management and not individual classroom management for individuals, as do some specializations (e.g., special education).

Content Knowledge

Novice teachers believe it is important to be competent in area-specific content knowledge (Schempp et al., 1993). Some novice teachers reported not gaining sufficient knowledge in the content areas that they were teaching (Chesley & Jordan, 2012). In contrast, Tsangaridou and Polemitou (2015) reported that not all novice teachers struggle with content area and the teachers reflect on ways to make the content knowledge more enjoyable for students. Unfortunately, many content areas in tertiary education have increased the focus on the subject matter because of policies such as No Child Left Behind (Stough & Montague, 2015). Students who will become teachers do not receive the same attention to the pedagogical coursework because of the increased emphasis on content areas (Stough & Montague, 2015) and are sometimes ill-equipped to teach what they know.

To combat deficiencies of content knowledge in novice physical education teachers, Sinelnikov, Kim, Ward, Curtner-Smith, and Li (2016) devised a method of intervention by creating professional development workshops. These workshops provided the opportunity for physical education teachers with limited knowledge in badmin-

ton to learn the game. The results indicated that a workshop lasting 4 hr was effective in positively changing the content knowledge of the novice physical education teachers, which had a direct positive effect on student comprehension of badminton skills.

Pedagogical and Emotional Support

Multiple studies have been conducted concerning support of the novice teacher, which can occur in the forms of planning, classroom management, or emotional. Gore and Bowe (2015) examined how the Quality Teaching Rounds (QTR) affected the support for novice teachers in Australia. QTR consists of small groups of teachers varying in career lengths, which allows for discussion, practice, and evaluation. QTR provides pedagogical support in allowing for feedback after observations of classroom teaching, which, as stated by the novice teachers, causes reflection of what they are teaching and how it is being taught. Emotional support using QTR is present in the statements of the participants, who said they see themselves as a "colleague" (p. 83) and are able to have a voice and speak about the daily routines that may be discouraging to a new teacher. Participants stated that they did not feel isolated within this structured environment (p. 83). Gore and Bowe concluded that the project had a positive effect on the retention of novice teachers in the study.

Burke, Aubusson, Schuck, Buchanan, and Prescott (2015) found that perceived support can have an effect on novice teachers' attrition as well. As reported, 47% of novice teachers had experienced isolated working environments with little collaborative efforts; 26% reported "limited professional conversations about teaching practice" (p. 247); and 14% reported having no professional development, which is required according to Australian standards. Novice teachers expressing intent to leave the field was 24%, with 55% citing wanting to leave because of working environments such as lack of teaching resource sharing, not being afforded to collaborate with experienced teachers, lack of "professional conversations" with other professionals or administration, and not enough access to mentors. Pedagogical and emotional support are vital in the growth and retention of novice teachers.

In a study conducted in Israel, Nasser-Abu Alhija and Fresko (2010) found three domains of support: emotional, ecological, and pedagogical. They found that during the novice teachers' induction

year that the perceived emotional support these teachers received was rated high and pedagogical support was rated the lowest. They also found that teachers tend to seek their own support in the form of informal mentors even though a formal mentor was assigned. The search for informal mentoring was due to a lack of quality feedback from the formal mentor. They found that the new teachers gave workshop usefulness low to moderate ratings.

Tannehill and Zakrajsek's (1988) study indicated that most of the support received by novice physical education teachers focused more on planning and classroom management and less toward encouragement, reinforcement, and praise. The support structure in the Tannehill and Zakrajsek study was perceived as being of little help with little quality feedback being offered.

Method

Purpose and Research Questions

Novice teachers are faced with many issues and concerns when they are starting a career. These concerns include managerial tasks in the classroom, support from administration and colleagues, content knowledge, and pedagogical concerns. The purpose of this case study was to examine novice physical education teachers in the first and second year of teaching.

The following questions drove the research:

- Question 1: What are the primary concerns of novice physical education teachers?
- Question 2: Are their concerns similar to those of novice teachers in other teaching fields?

It was the intent of this research to explore these areas of concern.

Design

A qualitative case study approach was selected because it provides for a more in-depth process to highlight experiences from the participants who may not otherwise have a voice or whose viewpoints are rarely echoed (Sofaer, 1999). According to Lincoln and Guba (1985), case studies are the choice for most naturalistic research because they lend to increasing the researcher's understanding of the proposed questions and display "characteristics that are

especially advantageous to the naturalistic inquirer" (pp. 357–358). Lincoln and Guba also mentioned that the case study alone is not the strongest way to present the information, because it can be "soft" or "sloppy" (p. 360). They suggest using other data such as artifacts, documents, and observations. To strengthen the case study, the researchers incorporated direct observations, field notes, semistructured interviews, and documents. According to Merriam (2009), these multiple methods of data collection also increase the "internal validity" (p. 215) or triangulation.

Participants

Purposive sampling was used to focus on novice physical education teachers. Siegle (2002) defines purposive sampling as the process of selecting a specific group because of certain characteristics that the researcher wants to capture. The participants in the study included two male novice physical education teachers.

John was 35 and was in his first year of teaching middle school physical education. John received his teaching certification through an alternative program. Prior to becoming a teacher, John worked in the private sector.

Mark was 24 and was in his second year of teaching elementary physical education. Mark received his teaching certification through a traditional route (i.e., teacher preparation program and student teaching). Mark was a substitute teacher prior to acquiring full-time employment.

Data Collection

In previous research on the concerns of novice teachers, the Teacher Concerns Questionnaire was used (Boggess, McBride, & Griffey, 1985; George, 1978). Fuller (1969) implied the answers from novice teachers may be limited because of the limited choices in the instrument. In this study, data were collected using observations, field notes, semistructured interviews, and documents. Observations occurred for 3 hr during a regular school day while both participants were teaching physical education, with a total of three physical education classes for each participant observed. Detailed notes were taken during the observations and later transcribed. Items observed were teacher behavior and communication skills dealing with instruction within a classroom setting.

After the conclusion of the observations and during a time that did not take away from educational responsibilities, semistructured interviews occurred. The semistructured interviews allowed for unrestricted answers that might not occur when using surveys and questionnaires. Each novice teacher was interviewed, with the interviews lasting between 45 and 60 min. Interviews were recorded on a handheld recording device and transcribed into a Word document.

Documents were collected from the novice physical education teachers. These documents were received during training at orientation. They consisted of PowerPoint slides, Word documents, and calendars.

Data Analysis

The observations, transcribed interviews, and collected documents were analyzed using open coding (Strauss & Corbin, 1990) and the constant comparison method (Glaser & Strauss, 1967). Two themes emerged after a thorough content analysis using Fuller's (1969) three-stage theoretical model of developmental conceptualization as a guide. As stated earlier, multiple methods of data collection were applied to triangulate. Key words were coded for similarities that fell into self-concerns and student concerns. Table 1 shows this information. The second theme, concerns with classroom management, procedures, and safety, is discussed thereafter.

Findings

During the analysis process, two main themes emerged. The first theme was teacher development, which was divided into the subcategories of self-concerns and student concerns. The second theme was concerns with classroom management, procedures, and safety.

Teaching Development: Self-Concerns and Student Concerns

Both instructors are developing as teachers. John and Mark are demonstrating characteristics of teacher concerns, with one being more concerned with self and the other being more concerned with students. Self-concerns and student concerns were interpreted using codes from the interviews. During the analysis of John and Mark transcribed interviews, key words or phrases fell into either self-concerns or student concerns. John, being in his first year, was in the self-concern developmental phase of teaching. John believed

that he needed more time to adjust to his new environment. He also reported that he did not feel as prepared coming into physical education mainly because of the lack of concentrated subject matter during his alternative certification process. John had more "I" and "me" statements during the interview.

Mark was in the student concern developmental phase of teaching. Mark had more statements that included "we" and that reflected his desire to engage students in the learning process. These key words or phrases are categorized as either self-concerns or student concerns as shown in Table 1. Not all statements are included in this table. The table highlights statements that stood out during the analysis phase.

Table 1
Key Words or Phrases of Self-Concerns and Student Concerns

	Teaching concerns	
Participant	**Self-concerns**	**Student concerns**
John	I had a bunch of questions.	What needs to happen when these kids come in, you know.
	What do I do, what are my procedures, what do I do if this happens?	There's no foul balls you have people running all the time.
	Do I sit them down, do I tell them to walk, do I do roll call? Tell me where to start because I don't know where to start.	How it made a kid feel.
	Perhaps all first year teachers have anxiety.	
	I was pretty nervous , not quite sure how handling a class of 13 to 14 year old kids is going to go.	
	You are left to your own devices quite a lot.	
	Sometimes I think I talk too much and I am too loud.	

Table 1 (cont.)

	Teaching concerns	
Participant	**Self-concerns**	**Student concerns**
Mark	I don't think I was completely prepared.	We can't do anything in half a gym.
	If I was by myself, I don't know if it would be overwhelming, but it would be more of a challenge.	It's easy to deal with kids having kid problems.
		Dealing with kids that can't speak any English.
		Then you've got some kids.
		We get to talk about what we're doing, plan on doing, what we shouldn't do, maybe what we should do.
		There were some awesome kids.

Concerns With Classroom Management, Procedures, and Safety

It was also found that these novice teachers had the same concerns as did classroom teachers. Even though similarities occurred regarding the issues that physical education teachers and other teachers experience, differences were evident within the areas of classroom management, procedures, and safety. Classrooms are different for physical education teachers than for classroom teachers and will be set up differently.

Classroom management. John said during his alternative certification program, he learned about classroom management, but it was not focused on physical education. Issues such as classroom setup and design were stressed, but not in the physical education area. John said this about his preservice training: "They give you ideas on what to do and give you a book and say, 'Here's best practices for some situations.'" John said this about the alternative certification program: "It's good to a certain point, but when it comes down to nuts and bolts, here's what you are going to do minute by minute, you really don't get that." He added,

> They did give you a classroom map and say you should set up your desks this way, your computer over here, and your desk should be this way and all this kind of stuff, but minute by minute, you know, organizational skills are sort of left out.

It was observed that John did have classroom management skills. John's students knew how to enter the gym. He had school-required material posted so students could see it. When asked if physical education was addressed in the alternative certification program, John replied, "No, you're to your own devices quite a lot, well always."

Mark is in his second year of teaching physical education. Mark was certified the traditional route through a teacher preparation program. Mark believes that student teaching prepared him for the tasks John was concerned about. Mark's classroom management concerns focused on proper implementation of parent–teacher conferences, student discipline, and maintaining relationships with teachers. Mark stated,

> You kind of know what you're doing as far as teaching PE; you got that, but then you've got all these other different situations as far as discipline or parent conversations, stuff like that. Then you've got your relationships with the teachers inside the building.

It was observed that Mark had not only a co-teacher but also a student teacher. Mark appeared to have a good, collegial relationship with his co-teacher and the student teacher.

Classroom management was present in the documents that were collected from John and Mark. John's had an outline for a model classroom. Items addressed in this outline were physical classroom appearance, material location, transition management, grading, and time management techniques. A document obtained from Mark titled "New Teacher Academy Planning Form" addressed classroom management topics, specifically differentiation.

Procedures. John voiced his concerns over issues such as taking attendance, dressing out, and warm-up. John's made statements such as the following:

> What do I do; what are my procedures; what do I do if this happens? Day one minute one, you know, what needs to happen when these kids come in? Do I sit them down, do I tell them to walk, do I do roll call? Tell me where to start because I don't know where to start. And, you know, warm-up, activities, cooldown, what's the time frame? How? What do you do here?

Mark had procedural dilemmas he encountered that he had to overcome that included standardized testing and picture day. Mark stated,

> You've got tons of procedural stuff inside the building. Then you get into STAAR stuff and learning all the things you've got to do and all the set standards as far as when it is STAAR test day and what we're supposed to do and all these different situations.

Both John and Mark voiced procedural concerns, each having a different perspective. Two documents obtained from John contained procedural tasks to assist a novice teacher when working with a mentor. This document titled "Working With Your Mentor" had a list of items to engage and not engage in while working with mentors. These "do" items included asking questions and goal setting. The "don't" items included being unprepared and mentor-driven agendas. The other document was a timeline that detailed meetings and due dates throughout the year for the mentoring he was receiving. Mark's documents were similar. A document obtained from Mark was the titled "New Year Academy Plan" and contained dates for meetings with his continued mentoring program.

Safety. Procedural missteps can quickly become safety issues. John joked that he was the "record holder" for broken bones. John recalled the accidents that students had in physical education that he dealt with as a first year teacher. John stated, "This person fell down and burst their head open, here's what you need to do, this person fell down and broke both their arms." John said he had five students who had broken bones during his first year as a physical education teacher.

During times when procedural events took place in the gymnasium, Mark worried about the safety of his student. Mark recalled picture day when his principal said she just needed half of the gymnasium and he could continue using the other half. Mark stated, "We can't do anything in half a gym while there's equipment set up on the other side."

Discussion

This qualitative case study explores the concerns of novice physical education teachers. The themes that emerged using contextual analysis were training, preparation, and the uncertainties of teaching. The two major findings were interpreted as self-concerns and student concerns, reflecting Fuller's (1969) three-stage theoretical model of developmental conceptualization, and concerns with classroom management, procedures, and safety.

Fuller categorized these concerns as "self-centered' and "pupil centered." These self-centered or self-focused concerns include areas such as discipline, how the teacher performs, time management, procedures, and conferences (i.e., parent and teacher). The areas of concern for pupil centered or student focused deal with progression of learning, student success, and proper implementation of content knowledge. Mark and John are at different stages in their careers, with only a year separating them. John's main focus was on classroom management, and he appeared to be in the self-concerns phase. John, in his first year, was still focused on self-concerns. First year physical education teachers tend to be concerned with self, concentrating on what to teach and how to teach (Napper-Owen & Phillips, 1995; Young, 2012). Mark was in his second year and was transitioning into students concerns. These concerns could be due to the difference in years of teaching or in the difference in the certification process. John was certified alternatively, and Mark was certified on the traditional path.

If teacher preparation programs are focused on the activities that self-focused novice teachers worry about, why do these patterns still exist? Boggess et al. (1985) revealed in their research that self-concerns when "in the presence of a supervisor" (p. 205) waned over time. Novice teachers should foremost be concerned with students during their in-service time. Young (2012) noticed this pattern as well in preservice teachers. How quickly do self-concerns

diminish? Once a preservice teacher is employed and starts the in-service part of his or her career, does this provoke a backsliding into self-concerns? Fuller (1969) suggested that students wanting to become teachers need to teach before enrolling in one education course, to combat the problem of focusing on self and not the student. Teacher preparation programs have included observations prior to acceptance into the program, but is this helping in shortening the self-focused period?

Even though similarities occurred regarding the issues that physical education teachers and classroom teachers experience, there were differences in classroom management, procedures, and safety. Classrooms are different for physical education teachers than for classroom teachers. The "classroom" is a gymnasium, which is larger than a normal classroom, with class sizes being larger in elementary and middle school. Procedurally physical educators will have students dressing out, warming up, and having to move around. Also, safety concerns are different for teachers in a traditional classroom. John labeled himself as the record holder of broken bones; most classroom teachers will not have to deal with bloody noses, fat lips, bruises, contusions, and fractures on a daily basis. Also, there are safety concerns when facilitating activities outside. Safety concerns include weather and allergies.

Schempp et al. (1993) described role demands as those "expectations teachers faced in school" (p. 457). Role demands were divided into two categories: explicit and implicit. Explicit demands included classroom management and procedures, and implicit demands included committees and pedagogy techniques. John's issues initially were more explicit, whereas Mark's issues during his second year were transitioning from explicit to implicit.

As stated earlier, novice teachers often feel overwhelmed in their new environments (Banville & Rikard, 2009). They may experience low status or feel unimportant, experience a lack support from other faculty in the school, or face inadequacies in classroom management and lesson planning (Banville & Rikard, 2009; Schempp et al., 1993). Neither one of the novice physical education teachers reported feeling a lack of support. Both John and Mark recognized and appreciated the support they received from their mentors that allowed them to adjust to their new surroundings.

Implications and Recommendations

One implication from this study points to the practice of creating induction and mentoring programs that are focused on teacher assimilation within a specialized field. Physical education, like many other areas, has different and unique characteristics. For example, Mark stated, "We can't do anything in half a gym while there's equipment set up on the other side." In what other classrooms does this occur? It is unlikely that half of a science or English classroom would be used to take pictures with the expectation that the teacher resume regularly scheduled classroom activities. Research has shown that collaborative efforts between novice teachers and mentors have produced successful outcomes in the areas of assimilation into the new atmosphere, classroom management, content delivery, and support (Stough & Montague, 2015). This could certainly be the case for novice physical education teachers, even more so because of the downplay of the importance of physical education (Blankenship & Coleman, 2009; Elliot, Atencio, Campbell, & Jess, 2013) and isolation (Smyth, 1993).

Another implication addresses the similarities of concerns of these two participants to other novice teachers concerns (i.e., classroom management, procedures, and safety), with the focus of addressing different occurrences within those areas of concerns. The majority of classroom teachers will not have to worry about theft from others from the locker room (classroom management in the area of discipline), broken bones (safety), or dressing out (procedures), but these are a part of the physical education teacher's concerns and need to be addressed at some point during the first year of teaching. This is why the development of induction and mentoring programs is important and must take into account pairing novice teachers with experienced teachers within the same field.

Recommendations for continued studies include comparing novice teachers who are certified alternatively with those certified by traditional methods to determine if the transition from self-focus to student focused occurs at different time frames. Researchers must also look in depth into induction and mentoring programs that allow out-of-subject mentoring to occur, to see how these relationships enhance or hinder the teacher's developmental stages. Last,

researchers need to determine if a link exists between attrition rates and teachers who stay in the self-focused stage longer.

References

Aloe, A. M., Amo, L. C., & Shanahan, M. E. (2014). Classroom management self-efficacy and burnout: A multivariate meta-analysis. *Educational Psychology Review, 26*(1), 101–126. https://doi.org/10.1007/s10648-013-9244-0

Banville, D., & Rikard, G. L. (2009). Teacher induction-implications for physical education teacher development and retention. *Quest, 61,* 237–256. https://doi.org/10.1080/00336297.2009.10483613

Blankenship, B. T., & Coleman, M. M. (2009). An examination of" wash-out" and workplace conditions of beginning physical education teachers. *The Physical Educator, 66,* 97–111.

Boggess, T. E., McBride, R. E., & Griffey, D. C. (1985). The concerns of physical education student teachers: A developmental view. *The Journal of Teaching in Physical Education, 4,* 202–211. https://doi.org/10.1123/jtpe.4.3.202

Burke, P. F., Aubusson, P. J., Schuck, S. R., Buchanan, J. D., & Prescott, A. E. (2015). How do early career teachers value different types of support? A scale-adjusted latent class choice model. *Teaching and Teacher Education, 47,* 241–253. https://doi.org/10.1016/j.tate.2015.01.005

Chesley, G. M., & Jordan, J. (2012). What's missing from teacher prep. *Educational Leadership, 69*(8), 41–45.

Conway, P. F., & Clark, C. M. (2003). The journey inward and outward: A re-examination of Fuller's concerns-based model of teacher development. *Teaching and Teacher Education, 19,* 465–482. https://doi.org/10.1016/S0742-051X(03)00046-5

Elliot, D. L., Atencio, M., Campbell, T., & Jess, M. (2013). From PE experiences to PE teaching practices? Insights from Scottish primary teachers' experiences of PE, teacher education, school entry and professional development. *Sport, Education, and Society, 18,* 749–766. https://doi.org/10.1080/13573322.2011.609165

Fuller, F. F. (1969). Concerns for teachers: A developmental conceptualization. *American Educational Research Journal, 6,* 207–226. https://doi.org/10.3102/00028312006002207

Fuller, F., & Brown, O. (1975). Becoming a teacher. In K. Ryan (Ed.), *Teacher education: Seventy-fourth year book of the National Society for the Study of Education, Pt. 2* (pp. 25–52). Chicago, IL: University of Chicago Press.

George, A. A. (1978). *Measuring self, task, and impact concerns: A manual for the use of the teacher concerns questionnaire.* The University of Texas, Research and Development Center for Teacher Education, Austin, TX.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research.* Hawthorne, NY: Aldine.

Gore, J. M., & Bowe, J. M. (2015). Interrupting attrition? Re-shaping the transition from preservice to inservice teaching through quality teaching rounds. *International Journal of Educational Research, 73,* 77–88. https://doi.org/10.1016/j.ijer.2015.05.006

Gray, L., & Taie, S. (2015). *Public school teacher attrition and mobility in the first five years.* Retrieved from U.S. Department of Education website: http://nces.ed.gov/pubs2015/2015337.pdf

Herbert, E., & Worthy, T. (2001). Does the first year of teaching have to be a bad one? A case study of success. *Teaching and Teacher Education, 17,* 897–911. https://doi.org/10.1016/S0742-051X(01)00039-7

Ingersoll, R. (2003). *Is there really a teacher shortage?* Philadelphia, PA: University of Pennsylvania, Consortium for Policy Research in Education. https://doi.org/10.1037/e382722004-001

Ingersoll, R. (2012). Beginning teacher induction: What the data tell us. *Phi Delta Kappan, 93*(8), 47–51. https://doi.org/10.1177/003172171209300811

Khan, F., Yusoff, R. M., & Khan, A. (2014). Job demands, burnout and resources in teaching a conceptual review. *World Applied Sciences Journal, 30*(1), 20–28.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry.* Beverly Hills, CA: Sage.

Marshall, S. A. (1998). *Instructing a 14-year-old home-schooled student: A case study of teacher development* (Master's thesis, Bowling Green State University, Bowling Green, OH). Retrieved from from http://maurice.bgsu.edu/record=b2300513~S9

Mawer, M. (2014). *The effective teaching of physical education.* New York, NY: Routledge

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation.* San Francisco, CA: Jossey-Bass

Napper-Owen, G. E., & Phillips, D. A. (1995). A qualitative analysis of the impact of induction assistance on first-year physical educators. *Journal of Teaching in Physical Education, 14,* 305–327. https://doi.org/10.1123/jtpe.14.3.305

Nasser-Abu Alhija, F., & Fresko, B. (2010). Socialization of new teachers: Does induction matter? *Teaching and Teacher Education, 26,* 1592–1597. https://doi.org/10.1016/j.tate.2010.06.010

Pigge, F. L., & Marso, R. N. (1997). A seven year longitudinal multi-factor assessment of teaching concerns development through preparation and early years of teaching. *Teaching and Teacher Education, 13,* 225–235. https://doi.org/10.1016/S0742-051X(96)00014-5

Richards, A. R., Templin, T. J., & Graber, K. (2014). The socialization of teachers in physical education: Review and recommendations for future works. *Kinesiology Review, 3,* 113–134. https://doi.org/10.1123/kr.2013-0006

Schempp, P. G., Sparks, A. C., & Templin, T. J. (1993). The micropolitics of teacher induction. *American Education Research Journal, 30,* 447–472. https://doi.org/10.3102/00028312030003447

Siegle, D. (2002). Purposive sampling. Retrieved from http://researchbasics.education.uconn.edu/purposive-sampling/

Sinelnikov, O. A., Kim, I., Ward, P., Curtner-Smith, M., & Li, W. (2016). Changing beginning teachers' content knowledge and its effects on student learning. *Physical Education and Sport Pedagogy, 21,* 425–440. https://doi.org/10.1080/17408989.2015.1043255

Smyth, D. M. (1993, April). *First year physical education teachers' perceptions of their workplace.* Paper presented at the Annual Meeting of the American Educational Research Association, Atlanta, GA.

Sofaer, S. (1999). Qualitative methods: What are they and why use them? *Health Services Research, 34*(5 Pt 2), 1101.

Stough, L. M., & Montague, M. L. (2015). How teachers learn to be classroom managers. In E. T. Emmer & E. J. Sabornie (Eds.), *Handbook of classroom management* (2nd ed., pp. 446–458). New York, NY: Routledge.

Strauss, A. L., & Corbin, J. M. (1990). *Basics of qualitative research: Grounded theory procedures and techniques.* Newbury Park, CA: Sage.

Tannehill, D., & Zakrajsek, D. (1988). What's happening in supervision of student teachers in secondary physical education. *Journal of Teaching in Physical Education, 8*(1), 1–12. https://doi.org/10.1123/jtpe.8.1.1

Tsangaridou, N., & Polemitou, I. (2015). Exploring pre-service classroom teachers' reflections on teaching physical education. *European Physical Education Review, 21*(1), 66–82. https://doi.org/10.1177/1356336X14550941

Young, S. (2012). Concerns of preservice physical education teachers participating in an early field experience. *The Physical Educator, 69,* 119–135.

The Physical Educator Vol. 73 • pp. 671–688 • 2016
https://doi.org/10.18666/TPE-2016-V73-I4-6554

PEDAGOGY

Content Analysis of Conceptually Based Physical Education in Southeastern United States Universities and Colleges

Suzanne Ellen Williams, Leon Greene, Sonya Satinsky, John Neuberger

Abstract

Purpose: *The purposes of this study were to explore PE in higher education through the offering of traditional activity- and skills-based physical education (ASPE) and conceptually based physical education (CPE) courses and to conduct an exploratory content analysis on the CPE available to students in randomized colleges and universities in the Southeastern United States.* ***Method:*** *A randomized sample of 56 institutions was screened to determine if PE and CPE courses were offered and/or required, followed by a closer examination of the CPE courses.* ***Results:*** *Preliminary research indicated that 73% of the institutions required PE as a general education requirement, 77% offered CPE, and 46% included CPE in the general education requirements. Further research suggested that upon comparison to national health- and PE-related standards and recommendations, many course content analysis criteria dependent variables including course components, description and objectives, curriculum, and evaluation scored 50% or higher, which indicated shared characteristics among all of the CPE courses.* ***Conclusions:*** *PE and CPE are important components of high-*

Suzanne Ellen Williams is an assistant professor, Kinesiology and Sport Science, University of South Dakota. Leon Greene is an associate professor, Health, Sport, & Exercise Sciences, University of Kansas. Sonya Satinsky is director, Center for Health Promotion, University of Massachusetts. John Neuberger is a professor, Preventive Medicine and Public Health, University of Kansas Medical Center. Please send author correspondence to suzanne.williams@usd.edu

er education, with the majority of the institutions in this sample including PE in their general education requirements. In addition, most of these institutions offered CPE, with nearly half stipulating a CPE requirement. More specifically, this sample of CPE courses shared many commonalities. Programming combining health education concepts in the classroom and regular PA and exercise in a laboratory setting may encourage students to have active, healthy lifestyles during the semester of enrollment that can be continued later in life.

A variety of physical education (PE) programs are being offered in higher education, including activity- or skills-related physical education (ASPE) and conceptually based physical education (CPE). Basic ASPE instructional programs were initially developed to be offered to the general college and university student populations and were designed to introduce the principles of health education and foster physical and skill development (Sloane & Sloane, 1986). Still today, students and faculty recognize these courses as central to PE programming on most college and university campuses. The status and nature of this activity- or skills-related instruction has evolved over the years and continues to be regarded as an important component of PE.

CPE was implemented to expand upon the traditional activity- and skills-based programming and, in addition, to build on that foundation by integrating physical activity (PA) and exercise with health and fitness concepts (Brynteson & Adams, 1993). CPE is considered a multidimensional course with the underlying philosophy that students should be instructed in a greater awareness of the importance of PA and exercise, in understanding their exercise needs more fully, and in the means to gain the most from their exercise to fulfill these needs (Corbin & Laurie, 1978). The significance of this type of course, then and now, is its intellectual and experiential qualities. Primary goals of the lecture are to assist college and university students in achieving an appropriate level of health and science literacy, to equip them with the knowledge and analytical skills needed to navigate through the labyrinth of diet and exercise myths and programs in today's society, and to support active students' health and exercise efforts. This type of course can promote not only an improved understanding of concepts such as energy balance and proper nutrition, but also the characteristics and prac-

tices of optimal health, thereby aiding students in exerting healthful behavioral change. The associated lab provides the opportunity to learn and practice various forms of PA and exercise and to use the coinciding concepts being learned in the classroom.

Literature Review

Higher education institutions slowly began to embrace CPE programming in the 1960s. In 1966, proponents for this concepts-based approach strongly believed that knowledgeable students had an increased likelihood to engage in healthy decision-making concerning their PA, fitness behaviors, and health (Carr & Walker, 1968; Corbin & Laurie, 1978; Flath & Leigh, 1966; Hallatt & Koenig, 1967).

The literature reveals that CPE-related course offerings including lifetime fitness classes are being broadly offered and addresses specific successful programs such as Project GRAD (Graduate Ready for Activity Daily; Calfas et al., 2000; Sallis et al., 1999), ARTEC Project (Active Recreation Tertiary Education Campuses; Leslie, Sparling, & Owen, 2001), Project TEAM (Teaching Exercise/Activity Maintenance; Buckworth, 2001), Training Interventions and Genetics of Exercise Response (TIGER) Study (Sailors et al., 2010), among many others, though not all are identified in this literature review (Adams, 1992; Brynteson & Adams, 1993; Carr & Walker, 1968; Corbin & Laurie, 1978; Flath & Leigh, 1966; Hallatt & Koenig, 1967; Laurie, 1981; Pearman, Valois, Sargent, Saunders, Drane, & Macera, 1997; Slava, Laurie, & Corbin, 1984; Terry, Erickson, & Johnson, 1977; Trimble & Hensley, 1990).

These intervention-inspired courses and programs were designed to highlight the importance of advocating, educating, and supporting integrated methodologies fusing the exercise and behavioral sciences, as well as the importance of providing opportunities and guidance in the application of these to students' lives. Some offerings included comprehensive CPE-based courses, complete with a lecture component, which is intended to educate college and university students about the health benefits of PA and risks of physical inactivity, the recommended PA and exercise patterns to promote health and fitness, the principles of injury prevention, and the theories and methods of behavioral self-management (Sallis et al., 1999), and a lab component to teach physical activities and help students use self-management techniques to implement their own exercise

program. Other institutions proffered activity-inspired media promotion and activity class programming, providing demonstrations of various activities, assorted fitness classes, and fitness assessments to students at no charge. Participation in these course offerings, programs, and services demonstrated that the majority of the students complied with exercise protocol, persisting in exercise despite encountering barriers such as finances, time, and other obligations. Such efforts also demonstrated that matching intervention offerings to students' perceived needs and preferences could influence PA in the university setting. Last, an increased adoption and maintenance of PA and exercise among young adults in transition from college and university to the adult roles was also witnessed. The motivation and success of these early documented offerings appear to be based on college credit, on merely student self-efficacy—based on the nonjudgmental approach used in the studies to teach students to exercise within their target heart rate zone, which should have produced positive physical changes—and on the social contexts of group/class membership.

Despite a lack of more recent research studies, the knowledge of theory and application learned through previous work continues to guide and support CPE programming. Since its early implementation in the 1960s, slow evolvement in the 1970s, and growth surge in the 1980s, this type of programming has seen a great deal of study and implementation in the 1990–2000s (Corbin & Laurie, 1978). Trimble and Hensley (1990) reported that approximately half of the surveyed colleges and universities offered a concepts-based course, and 33% of all higher education institutions accepted this type of PE course as a general education requirement. Other statistics show that by 2000 the percentage of higher education institutions offering a lecture–laboratory course increased to 60%. There was further growth with 90% of the reporting colleges and universities offering CPE in 2009 (Kulinna, Warfield, Jonaitis, Dean, & Corbin, 2009). There has been an upwards trend in the increased offering of CPE in the last few decades, but there is also the threat of all PE being discontinued as a requirement, and even eliminated altogether, because of the lack of financial resources and call to revise and/or decrease graduation requirements (Coe, Pivarnik, Womack, Reeves, & Malina, 2006; Kupchella, 2009). Efforts need to be continually

sought to research CPE programming and its provision of physical and health education sufficiently, including effective exercise interventions to young adult college and university students while they are in school and well beyond in their lifetime.

Method

Purpose and Design

The purposes of this study were to investigate the offering of ASPE and CPE courses and to conduct an exploratory content analysis on the CPE available to students in randomized colleges and universities in the Southeastern United States. The primary intent was to explore and analyze CPE courses to determine commonalities among the programs. The secondary purpose was twofold: (a) to obtain a description of the PE requirements (including ASPE and CPE) at each institution and (b) to determine whether each institution offers CPE as an elective.

The design of this research study was a randomized exploratory content analysis. The National Center for Education Statistics (NCES) was researched to identify 4-year general education public and private liberal arts colleges and universities in the Southeastern region of the United States including the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia. According to these statistics, there are 296 colleges and universities in this geographical area (NCES, 2013). A random sample of approximately 20% was generated through SPSS, with 56 correctly identified to be subject to further analysis. Approval was sought from the institutional review boards (IRBs) at the principal investigator's institutions; however, it was deemed unnecessary because human participants were not used.

Procedures

Following the randomized selection of colleges and universities in the Southeast, preliminary research concerning their PE requirements and CPE course offerings was completed. General education requirements from the institutions' program catalogs were examined to determine the presence of PE requirements and availability of CPE programming. Further research included contacting the

identified department or staff affiliated with PE from each of the randomized institutions, and the following CPE course materials were requested: course syllabus, which was looked to contain the course components (duration of semester, percentages of lecture and activity), description and objectives, curriculum topics, and coursework to be evaluated; exams covering the material taught; and handouts or descriptions of course topics, assignments, activities, technology, or teaching aids not referred to in the course syllabus. Study participation was noncompensated and voluntary. Each institution was assured that information collected would be used only for study purposes and remain confidential.

CPE course content was sought through direct examination of the course by reviewing the aforementioned materials; however, if a lack of clarity existed, questions were posed to the appropriate department/staff of the institution. For this course content analysis, message content was the primary focus, with the primary investigator responsible for key word coding. A highlighted key word or phrase from each criterion was compared to the data obtained from the course components, description and objectives, curriculum topics, and evaluation, and it was determined whether each message content variable was compliant. The syllabus was relied upon to provide this information and acquired through the department/course webpage on the website of the institution and/or requested directly from the instructor listed to teach the course.

CPE course content analysis was facilitated through a modified content analysis system assessment instrument that was developed including a number of criteria dependent variables. The creation of these dependent variables was guided, in part, through the culmination of slight modifications from primarily three references. These sources of guidance included the Health Education Curriculum Analysis Tool (HECAT) and the Physical Education Curriculum Analysis Tool (PECAT), both created by the Centers for Disease Control and Prevention (CDC) for school and adolescent health, and Knowledge, Skills, and Abilities (KSAs), as identified and recognized by the American College of Sports Medicine (ACSM). In addition, the investigator proposed a small number of curriculum content-related additions. The proposed additions included broader health topics often offered in more inclusive lifetime

health-and-wellness-related courses, but not included in the references from the CDC and the ACSM.

The HECAT builds on the "characteristics of effective health education curricula" (CDC, 2009, p. 1) and health education topic module areas as recognized by the CDC, as well as the National Health Education Standards (NHES) formulated by the Joint Committee on National Health Education Standards (CDC, 2009). The PECAT is based on the National Standards for Physical Education (NSPE) as set forth by the National Association for Sport and Physical Education (NASPE) that are required to be incorporated into successful school PE programs (CDC, 2006). The KSAs declared by the ACSM are a set of expectations often applied to higher education exercise-science-related degree courses and health-and-fitness-related general education (ACSM, 2010). In addition, other unique criteria dependent variables that have been recognized to be included in lifetime health-and-wellness-related courses were sought and recorded including stress management, as well as spiritual, social, and environmental health (Kupchella, 2009; LaFountaine, Neisen, & Parsons, 2006; McCormick & Lockwood, 2006; McGee, Nagel, & Moore, 2003). All of the course content analysis criteria dependent variables were modified and developed, with the key terms or phrases highlighted, and used for this study in the review of CPE course components, description and objectives, curriculum, and evaluation measures (see Table 1).

Table 1
CPE Course Content Analysis Criteria Dependent Variables

Source of guidance	Description
Course Components	
HECAT.C11	Course provides adequate time for instruction and opportunity for learning (semester duration)
PECAT9-12.S3	Associated lab allows learner to participate regularly in physical activity (% lecture, activity)

Table 1 (cont.)

Source of guidance	Description
Description and Objectives	
HECAT.C1	Focuses on clear health goals and related behavioral outcomes
HECAT.C2	Is research based and theory driven
HECAT.C3	Addresses individual and group norms that support health-enhancing behaviors
HECAT.C5	Addresses social pressures and influences
HECAT.C10	Incorporates learning strategies, teaching methods, and materials that are culturally inclusive
Curriculum	
HECAT.M.PHW/HECAT.C7	Personal health and wellness
HECAT.M.PA/PECAT9-12.S2	Physical activity/fitness/exercise principles[a]
ACSM.1.8	Body composition[a] and weight management
ACSM.1.2	Pathophysiology and risk factors/prevention
DSADD.1[a]	Stress management
HECAT.C4,5/ACSM.1.9	Human behavior and counseling
HECAT.M.ATD	Alcohol, tobacco, and other drugs
HECAT.M.SH	Sexual health
HECAT.M.S	Safety
HECAT.M.V	Violence
HECAT.M.MEH	Mental and emotional health
DSADD.2[a]	Spiritual health
DSADD.3[a]	Social health
DSADD.4[a]	Environmental health

Table 1 (cont.)

Source of guidance	Description
Evaluation	
Pre-, post-fitness assessment	
PECAT9-12.S2	The learner demonstrates understanding of movement concepts, principles, strategies, and tactics as they apply to the learning and performance of physical activities
Quizzes, exams	
HECAT.S1	Students will comprehend concepts related to health promotion and disease prevention to enhance health
Personal improvement project Journal (incl. exercise)	
HECAT.S2	Students will analyze the influence of family, peers, culture, media, technology, and other factors on health behaviors
HECAT.S5	Students will demonstrate the ability to use decision-making skills to enhance health
HECAT.S6	Students will demonstrate the ability to use goal-setting skills to enhance health
HECAT.S7	Students will demonstrate the ability to practice health-enhancing behaviors and avoid or reduce health risks
HECAT.C4	Focuses on increasing personal perception of risk and harmfulness of engaging in specific health risk behaviors and reinforcing protective factors
HECAT.C5	Addresses social pressures and influences
HECAT.C6	Builds personal competence, social competence, and self-efficacy by addressing skills

Table 1 (cont.)

Source of guidance	Description
HECAT.C7	Provides functional health knowledge that is basic, is accurate, and directly contributes to health-promoting decisions and behaviors
HECAT.C9	Provides age- and developmentally appropriate information, learning strategies, teaching methods, and materials
HECAT.C12	Provides opportunities to reinforce skills and positive health behaviors
PECAT9-12.S4	The learner achieves and maintains a health-enhancing level of physical fitness
PECAT9-12.S6	The learner values physical activity for health, enjoyment, challenge, self-expression, and/or social interaction
Wellness research paper	
HECAT.S3	Students will demonstrate the ability to access valid information and products and services to enhance health
Discussions, activities, case studies	
HECAT.S4	Students will demonstrate the interpersonal communication skills to enhance health and avoid or reduce health risks
HECAT.C3	Addresses individuals and group norms that support health-enhancing behaviors
HECAT.C8	Uses strategies designed to personalize information and engage students
HECAT.C13	Provides opportunities to make positive connections with influential others

Table 1 (cont.)

Source of guidance	Description
Community health advocacy project	
HECAT.S8	Students will demonstrate the ability to advocate for personal, family, and community health

Note. ACSM.1 = ACSM Knowledge, Skills, and Abilities. General Population; DSADD = Dissertation Study Added Component (criteria independently added by investigator); HECAT.C = Health Education Curriculum Analysis Tool. Characteristics of Effective Health Education Curricula; HECAT.M = Health Education Curriculum Analysis Tool. Health Topic Modules; HECAT.S = Health Education Curriculum Analysis Tool. National Health Education Standards; PECAT9-12.S = Physical Education Curriculum Analysis Tool for 9th–12th grade. National Standards for Physical Education.

[a]Component added to existing criteria.

The HECAT health education curricula and the NSPE from the PECAT were referenced in the analysis of the CPE course components, description and objectives, and some modes of evaluation. HECAT health education curricula and health topic modules, NSPE from the PECAT, the ACSM KSAs, and independently added criteria provided curriculum guidance. And primarily the NHES and health education curricula of the HECAT, along with select NSPE from the PECAT, enabled analysis of evaluation within the CPE courses. Various types of recognized evaluations demonstrating the NHES and health education curricula of the HECAT were included, NSPE from the PECAT were included, and review provided opportunity for other modes to be identified.

The content analysis criteria dependent variables used for this research were sought from professional organizations for educators and practitioners intended to provide guidelines for school-aged and adolescent health education. These recognized standards pertain to slightly younger age groups in particular, but the organizations attempt to reach all children and adolescents, preparing them for young adulthood. Given the relatively close proximity in age, as well as the decline of participation in daily PE, these guidelines seem to be justifiable for the young adult college and university student population (CDC, 2006). Accordingly, given the role of career preparation for health educators and exercise-science-related practitioners, these

review methods tend to provide more stringent health and exercise education standards because their use is intended to govern health-, sports-medicine-, and exercise-science-related education and practices. The CPE courses in this study were not designed to prepare professionals for the health education or exercise science fields; however, their related curricula were intended to instruct and provide quality experiences and support for health and fitness knowledge by providing competency-based health education. The use of such strict guidelines composing the modified content analysis system of this study was predicted to be appropriate and deemed reliable because it would reinforce the importance of the depth and breadth of CPE for the college and university student populations.

Data Analysis

Descriptive statistics were used to look at the primary and secondary foci of this study. For the primary investigation of CPE course content, 20 of the 56 (36%) institutions responded to the initial inquiry of course materials. The CPE course syllabus was the primary resource provided by all of the participating institutions, with two offering access to other course materials on an online course management platform. Therefore, the syllabus was the focus in the analysis of the course content. All of the CPE courses shared many commonalities, including their course components, description and objectives, curriculum, and evaluation. Descriptive statistics revealed that 17 of the 28 course content criteria dependent variables scored 50% or higher for 61% of the courses sharing commonalities and characteristics (see Table 2). For the secondary investigation regarding the institutional PE requirements and CPE offering, the investigator examined all 56 institutions through independent research of the course catalog for each institution. PE was included in the general education requirements in 41 of the 56 randomized institutions, for 73%. Furthermore, of these, 26 out of 56 (46%) specifically had a CPE requirement. Additionally, a CPE course offering was found in 43 of the 56 institutions, revealing that 77% of the randomized institutions offered a CPE-related course as either a required course or an elective course (see Table 3).

Table 2
CPE Exploratory Content Analysis Results

Criteria dependent variables	Institutions *N* = 20	%
Course components		
Adequate time	20	1.00
Regular PA	15	.75
Description and objectives		
Clear health goals, behavioral outcomes	20	1.00
Research based, theory driven	20	1.00
Individual and group health-enhancing norms	18	.90
Social pressures, influences	15	.75
Culturally inclusive teaching strategies, materials	3	.15
Curriculum		
Personal health and wellness	20	1.00
PA/fitness/exercise principles	20	1.00
Nutrition and healthy eating	19	.95
Body composition and weight management	17	.85
Pathophysiology and risk factors/prevention	15	.75
Stress management	18	.90
Human behavior and counseling	12	.60
Alcohol, tobacco, and other drugs	12	.60
Sexual health	9	.45
Safety	10	.50
Violence	3	.15
Mental and emotional health	6	.30
Spiritual health	2	.10
Social health	6	.30
Environmental health	4	.20
Evaluation		
Pre-, post-fitness assessment	9	.45
Exams, quizzes	18	.90
Personal improvement project; journal; self-evaluation	16	.80
Wellness research paper	7	.35
Small group discussions, activities, case studies	8	.40
Community health advocacy/promotion assignment	1	.05

Table 3
PE Requirements/CPE Course Offerings

Institutional requirements/course offerings	Institutions $N = 56$	%
PE general education requirement	41	.73
CPE general education requirement	26	.46
CPE course offering	43	.77

Discussion

The investigation and review of data for this exploratory content analysis study were based on an inductive approach focusing on specific observations leading to generalizations and inferences about the likenesses of CPE courses and of PE and CPE course offerings and requirements (Prince & Felder, 2006). Course materials were solicited, with primarily the syllabus being supplied and serving as the evidence. Then careful examination took place, and the course syllabi were compared to the content analysis criteria dependent variables that composed the modified assessment instrument. Key content words and phrases taken directly from national educational and professional standards that served as the criteria dependent variables were presumed to be trustworthy and reliable. After considerable review that led to a discernible pattern, results indicated many commonalities among the CPE course offerings. The similar content criteria inferred that the educators in the randomized CPE courses were attempting to incorporate the recommendations based on the expert guidance of the CDC, Joint Committee on National Health Education Standards, NASPE, and ACSM into their course content. In addition, the inclusion of PE in the general education requirements and CPE offerings of the institutions demonstrated a fairly optimal perspective on the importance of PE and CPE, with the majority of the institutions requiring PE as an integral component of their general education curriculum as well as offering CPE. In fact, nearly half required the latter, particularly as a part of their general education requirements. These results suggest the vital importance of CPE programming as a specific, notable part of general education. This study yielded comparable results to earlier studies, even demonstrating a higher statistical finding that approximately 77% of

colleges and universities offer CPE and 46% accept it as a general education requirement (Kulinna et al., 2009; Trimble & Hensley, 1990). Paralleled growth was also evident, with 60% of higher education institutions offering CPE by 2000 and 73% currently, according to this study sample, though it appears that growth may have spiked at 90% in 2009 (Kulinna et al., 2009). Despite the slight decrease, CPE in higher education remains fairly high. However, even this decrease demonstrates the need for continued research and support to maintain and support CPE programming.

Conclusion

This study yielded a number of conclusions. CPE offers students attainment of the intellectual knowledge of health and fitness learned in the classroom and the experiential opportunity to participate in regular PA and exercise in a laboratory setting, thereby encouraging lifelong habits associated with an active, healthy lifestyle. Thus, CPE programming should continue to be implemented to include physical and health education, along with PA and exercise recommendations, at the higher education level for maximum effectiveness. Moreover, CPE is an effective measure in positively affecting the lives of college and university students during the time of their enrollment in the course and in preparing them to strive to attain regular PA and improved health throughout their lifetime. Further study is warranted into the curricular content of CPE courses to bolster present and future CPE programming.

Recommendations

Based on the utilized methodology and findings of this study, there are a number of suggested recommendations for future research. To aid research, researchers might provide an incentive for participating institutions to fulfill an entire request of course materials including the syllabus, topic schedule, exam copies, coursework, and other instructional aids or additionally request access to CPE instructors' online classroom management platforms to gain additional course materials and perspective into the manner in which the courses are taught. Another measure to ensure greater reliability and validity is use of a panel of investigators designated to review the course materials, rather than only one primary investigator. For further investigation into content and possibly pedagogy, researchers

could inquire about the course (student) enrollment to gain further insight into instructor–student ratio; class participation; and successful, sustainable pedagogical methods.

References

Adams, T., II. (1992). A comparison of attitudes and exercise behaviors of alumni from universities with varying degrees of physical education programs. *Research Quarterly for Exercise and Sport, 63,* 148–152. https://doi.org/10.1080/02701367.1992.10607574

American College of Sports Medicine. (2010). *ACSM's guidelines for exercise testing and prescription* (8th ed.). Philadelphia, PA: Lippincott, Williams, & Wilkins.

Brynteson, P., & Adams, T. M., II. (1993). The effects of conceptually based physical education programs on attitudes and exercise habits of college alumni after 2–11 years of follow-up. *Research Quarterly for Exercise and Sport, 64,* 208–214. https://doi.org/10.1080/02701367.1993.10608798

Buckworth, J. (2001). Exercise adherence in college students: Issues and preliminary results. *Quest, 53,* 335–345. https://doi.org/10.1080/00336297.2001.10491750

Calfas, K. J., Sallis, J. F., Nichols, J. F., Sarkin, J. A., Johnson, M. F., Caparosa, S., . . . Alcaraz, J. E. (2000). Project GRAD: Two-year outcomes of a randomized controlled physical activity intervention among young adults. *American Journal of Preventive Medicine, 18,* 28–37. https://doi.org/10.1016/S0749-3797(99)00117-8

Carr, W., & Walker, W. (1968). Adapting "foundations" to the small liberal arts college program. *The Physical Educator, 25,* 27–28.

Centers for Disease Control and Prevention. (2006). *Physical Education Curriculum Analysis Tool (PECAT)*. Retrieved from http://www.cdc.gov/healthyyouth/pecat/pdf/PECAT.pdf

Centers for Disease Control and Prevention. (2009). *Health Education Curriculum Analysis Tool (HECAT) overview.* Retrieved from http://www.cdc.gov/healthyyouth/hecat/pdf/hecat_overview.pdf

Coe, D. P., Pivarnik, J. M., Womack, C. J., Reeves, M. J., & Malina, R. M. (2006). Effect of physical education and activity levels on academic achievement in children. *Medicine & Science in Sports & Exercise, 38,* 1515–1519. https://doi.org/10.1249/01.mss.0000227537.13175.1b

Corbin, C. B., & Laurie, D. (1978). Exercise for a lifetime: An educational effort. *Physician and Sports Medicine, 7,* 51–55.

Flath, A., & Leigh, R. (1966). "Know why" in basic instruction. *The Physical Educator, 23,* 163–164.

Hallatt, D., & Koenig, W. (1967). The "hows" or "whys": Which comes first? *The Physical Educator, 24,* 171–172.

Kulinna, P. H., Warfield, W. W., Jonaitis, S., Dean, M., & Corbin, C. (2009). The progression and characteristics of conceptually based fitness/wellness courses at American universities and colleges. *Journal of American College Health, 58,* 127–131. https://doi.org/10.1080/07448480903221327

Kupchella, C. E. (2009). Colleges and universities should give more broad-based attention to health and wellness—at all levels. *Journal of American College Health, 58,* 185–186. https://doi.org/10.1080/07448480903375946

LaFountaine, J., Neisen, M., & Parsons, R. (2006). Wellness factors in first year college students. *American Journal of Health Studies, 21,* 214–218.

Laurie, D. (1981). Knowledge, attitudes, and reported behavior before and after a lecture-laboratory physical fitness class. *The Physical Educator, 38,* 50–54.

Leslie, E., Sparling, P. B., & Owen, N. (2001). University campus settings and the promotion of physical activity in young adults: Lessons from research in Australia and the USA. *Health Education, 101,* 116–125. https://doi.org/10.1108/09654280110387880

McCormick, J., & Lockwood, P. (2006). College student perception of wellness concepts. *The Physical Educator, 63,* 78–103.

McGee, M., Nagel, L., & Moore, M. K. (2003). A study of university classroom strategies aimed at increasing spiritual health. *College Student Journal, 37,* 583–595.

National Center for Education Statistics. (2013). College navigator. Retrieved March 5, 2013, from http://nces.ed.gov/collegenavigator/?s=AL+AR+FL+GA+KY+LA+MS+NC+SC+TN+VA+WV&l=93&ic=1

Pearman, S. N., III, & Valois, R. F., Sargent, R. G., Saunders, R. P., Drane, J. W., & Macera, C. A. (1997). The impact of a required college health and physical education course on the health status of alumni. *Journal of American College Health, 46,* 77–85. https://doi.org/10.1080/07448489709595591

Prince, M. J., & Felder, R. M. (2006). Inductive teaching and learning methods: Definitions, comparisons, and research bases. *Journal of Engineering Education, 95,* 123–138. https://doi.org/10.1002/j.2168-9830.2006.tb00884.x

Sailors, M. H., Jackson, A. S., McFarlin, B. K., Turpin, I., Ellis, K. J., Foreyt, J. P., . . . Bray, M. S. (2010). Exposing college students to exercise: The training interventions and genetics of exercise response (TIGER) study. *Journal of American College Health, 59,* 13–20. https://doi.org/10.1080/07448481.2010.483712

Sallis, J. F., Calfas, K. J., Nichols, J. F., Sarkin, J. A., Johnson, M. F., Caparosa, S., . . . Alcaraz, J. E. (1999). Evaluation of a university course to promote physical activity: Project GRAD. *Research Quarterly for Exercise and Sport, 70,* 1–10. https://doi.org/10.1080/02701367.1999.10607725

Slava, S., Laurie, D., & Corbin, C. B. (1984). Long-term effects of a conceptual physical education program. *Research Quarterly for Exercise and Sport, 55,* 161–168. https://doi.org/10.1080/02701367.1984.10608393

Sloane, D. C., & Sloane, B. C. (1986). Changing opportunities: An overview of the history of college health education. *Journal of American College Health, 34,* 271–273. https://doi.org/10.1080/07448481.1986.9938949

Terry, J. W., Erickson, C., & Johnson, D. J. (1977). Changing habits by changing attitudes. *Journal of Physical Education, Recreation, and Dance, 48,* 13.

Trimble, R. T., & Hensley, L. D. (1990). Basic instruction programs at four-year colleges and universities. *Journal of Physical Education, Recreation, and Dance, 61,* 64-73. https://doi.org/10.1080/07303084.1990.10604555

The Physical Educator Vol. 73 • pp. 689–703 • 2016
https://doi.org/10.18666/TPE-2016-V73-I4-7024

PEDAGOGY

Effects of Music on Physical Activity Rates of Junior High School Physical Education Students

Lindsey Brewer, David C. Barney, Keven A. Prusak, Todd Pennington

Abstract

Music is an everyday occurrence in a person's life. Music is heard in the workplace, in homes, and in the mall. Music can also be heard as a person exercises. Therefore, the purpose of this study was to examine the effects of music on junior high students (n = 305) step counts and time in activity in junior high school physical education classes. In this study, students wore pedometers, and a 2 (conditions: with and without music) × 2 (activities: basketball and volleyball) crossover design was used. It was found that across all grades (7th, 8th, and 9th) and gender, more steps were taken with music in both activities versus without music. No significant differences were noted in time in activity between activities with music (2,839 steps taken in basketball) than without music (2,494 steps taken in basketball). Music is a tool that can assist junior high school physical educators in meeting the objectives of having students in physical activity for a majority of class time. It made students' physical activity experience enjoyable.

Lindsey Brewer is a PE teacher at Mapleton Junior High School. David C. Barney is an associate professor at Brigham Young University. Keven Prusak is an associate professor at Brigham Young University. Todd Pennington is an associate professor at Brigham Young University. Please send author correspondence to David_Barney@byu.edu

Music can be found in many facets of everyday living. People listen to music when driving around town, at their workplaces, and while shopping in the local mall. All human movement seems to be rhythmic in nature and tempo (Chen, 1985). Chen continued by stating, "We breathe in rhythm, walk and sleep in rhythm, as children we all move happily and unselfconsciously — just play some music with a definite beat and watch as little ones respond with the joy of moving in space" (p. 19). Another area in which music affects a person is during physical activity. Karageorghis and Terry (1997) found that music during physical activity (a) improves motor performance, (b) increases aerobic endurance, (c) enhances the exercise experience by serving as a distraction and lowering perceived effort, and (d) provides a positive environment to learn and practice skills. These types of responses to music have helped create a conceptual framework to help provide support for research, namely, (a) rhythm response, (b) musicality, (c) cultural impact, and (d) association (Priest, Karageorghis, & Sharp, 2004). Rhythm response refers to musical rhythm, most notably tempo. Tempo refers to the speed of the music as measured in beats per minute (BPM). Musicality refers to the responses to pitch-related elements such as harmony and melody. Cultural impact refers to the pervasiveness of the music within society. Association refers to extramusical associations such as emotions that a piece of music may evoke (Karageorghis, Jones, & Low, 2006). Karageorghis, Terry, and Lane (1999) presented this conceptual model using these four factors to predict the effects of asynchronous (i.e., absent of conscious synchronization between physical movement and accompanying musical rhythm such as background music) motivational music in the context of exercise and sport.

Researchers have investigated the effects of music within the physical activity setting. For example, Karageorghis et al. (2006) investigated the link between exercise intensity and music tempo and music tempo preference. College-aged students were to pick their top three artists for use in the study and then walk on a treadmill at levels of intensity while wearing a heart rate monitor and listening to the selection of music. Results indicated that the college-aged students preferred fast tempo music and that the fast tempo music accompanied increased workload intensity. In a similar study, Copeland and Frank (1991) compared college-aged students walking on a treadmill, listening to soft/slow tempo music and upbeat/

fast tempo music. They found that the students listening to the soft/slow tempo music generally exhibited a lowered heart rate compared to an exercise group that listened to upbeat/fast tempo music.

Much of the research dealing with the effects of music on physical activity has been conducted in laboratories or in fitness clubs. Another context in which music research has occurred is the physical education (PE) setting. Deutsch and Hetland (2012) examined fourth and fifth grade students' scores and effect of music, perceived enjoyment, and perceived work effort throughout the PACER (Progressive Aerobic Cardiovascular Endurance Run) test in elementary PE classes. For this study, students experienced one of three variations provided by the PACER CD: Version "A" with a high tempo background music, Version "B" with a mild tempo background music, and Version "w/o" that included no music. After completing the PACER test, students filled out a survey regarding the effort they gave, if they enjoyed the music that played during the PACER test, if the music motivated the student during the test, and their rating of their performance. Deutsch and Hetland found that the students generally scored higher on the PACER test when one of the two music versions was played during the test. They went on further to suggest that the female students performed better with the Version "A" (faster tempo) music. The male students performed better in the PACER test with the Version "B" (mild tempo) music. The results from the survey after the PACER test showed that students had a better attitude toward the PACER test when music was played.

In another study in a PE setting, Barney and Prusak (2015) investigated the effects of music on physical activity of elementary children during PE lessons. For this study, 115 third, fourth, and fifth graders participated in two Frisbee lessons and two walking activities lessons. One lesson for both activities had music, and the other two lessons had no music playing. Barney and Prusak found that the students were more active (higher step counts) in both lessons with music playing. Another finding from this study was that the students preferred fast tempo music, and when the fast tempo music was playing, the workload intensity increased.

Finally, in a PE setting, Ward and Dunaway (1995) investigated the effects of contingent music on laps run in a high school PE class. For this study, the researchers used a high school PE class of 36 stu-

dents. They randomly selected four students to observe their running of laps during class. They found that the number of laps ran increased from 1 lap to nearly 3 laps/min when music was played for the four students, thus representing an increase in the exercise pattern of .5 mile/lesson.

These research studies have shown that music can positively affect student output in a PE class. With the results from these studies in a PE setting, additional research is needed to investigate the effects of music on different student populations in a PE setting. Thus, the purpose of this study was to examine and report the effects of music in junior high PE classes. The researchers hypothesized that playing music during PE classes would increase steps taken and increase time in activity, compared to no music resulting in lower steps counts and lower amounts of time in activity. They also hypothesized that students' level of enjoyment with music playing during activities would be higher than without music playing.

Method

Participants and Setting

For this study, 305 junior high school students (151 males, 154 females) from eight intact seventh, eighth, and ninth grade classes (ages 11–15), separated by grade and gender, participated. The school's classes ran on a block schedule, A-day/B-day, with class lasting approximately 80 min from bell to bell. The participants were middle class socioeconomic status, with 88.8% of the students being Caucasian (USA School Info, 2013). The two teachers (one male, one female) who participated in this study averaged 15 years of teaching junior high school PE.

Procedures and Data Collection

The university institutional review board (IRB) and the school district approved of the study. Parental and student consent was also secured. Researchers attended the school for 1 day and instructed the students in how to wear, use, and read a pedometer properly, to ensure reliable data collection. Students were instructed that upon entering class they were to get a pedometer and secure it to the waistband of their shorts. Students were further instructed that after class announcements, after warm-up activities, they were to reset their

pedometers back to 0 for correct data collection. Then at the conclusion of the class activities, the students were to record their number of steps, time in activity, and level of enjoyment during the lesson on the student record sheet. A student record sheet was created for each student. Students had a place to record number of steps, time in activity, and level of enjoyment on their record sheet. The researchers created one statement on the student record sheet to rate their level of enjoyment during the activities, on a scale of 1 to 5 (1 = *lowest level of enjoyment,* 5 = *highest level of enjoyment*).

The music selection used for this study consisted of popular, upbeat, fast tempo, 120–160 BPM songs suggested by junior-high-aged students. The researchers had easy access to junior high students and thus asked them to list the songs they enjoy working out to. The students polled to help the researchers in selecting music were not involved in the data collection of the study. After compiling a list of 40 songs, the researchers listened to the songs and narrowed them down to school-appropriate songs that fit the tempo requirement. The songs that fit the requirements were made into a playlist that could be played through an iPod or CD player over a loud sound system.

Prior to data collection, the classroom teachers who participated in this study received training from the researchers on the lessons that were taught for the study. The lessons were restricted by the researchers in content and time to create a controlled environment for the study. The lessons were restricted to 40 of the 65 min of actual gym time. By using only two thirds of the class time, teachers had a buffer at the beginning and at the end of the class periods for regular class procedures and data collection. Following training, the classroom teachers began by teaching the designed lessons for basketball and volleyball for both conditions (music/no music). An example of a lesson taught by the junior high school physical educators included 8 min of station work, 30 min of game play (5 vs. 5), and 2 min to record pedometer data. This occurred for the basketball and volleyball lessons. The teachers taught the lesson for basketball for 2 days (two lessons) for each group using both conditions (music/no music), with data collection at the end of each lesson. The second round of data collection for volleyball occurred the following week using the same design as basketball (2 days and two lessons). The

students again recorded pedometer data, step counts, and time in activity at the end of each lesson. The students in this study participated in all the basketball and volleyball lessons.

Pedometer Instrument

The Yamax Digi-Walker LS 2525 was the pedometer used to collect student step counts and time in activity. The pedometer model records step counts, distance covered, calories burned, and time students were in activity. The pedometer also has a clock that runs when the student is in movement and stops when the student is not moving (standing). Time in activity is recorded in hours, minutes, and seconds. This pedometer was found reliable from previous research (Barney, Mauch, & Pleban, 2008).

Data Analysis

SPSS 21.0 was used to analyze the data. For this study, a 2 (conditions: music/no music) × 2 (activities: basketball/volleyball) within and within repeated-measures ANOVA was used for this study. Multiple measures (MANOVA) were also used to further test for significant differences. Post hoc comparison (Tukey's Honest Significant Difference, HSD) tests were run to reveal significant differences in step counts and time in activity, between activities with and without music.

Results

Descriptive Statistics

For this study, means, standard deviations, and effect sizes for steps taken and time in activity are shown for females in Table 1, males in Table 2, and combined genders in Table 3. All mean differences between conditions, music/no music, are in the anticipated direction. That is, the music condition demonstrated increased number of steps and time in activity.

Table 1
Descriptive Statistics for Females in Their Respective Grades for Step Counts and Time in Activity for Study 1

Activity/ Condition	Grade			
	7 (*n* = 75) *M* (*SD*)	8 (*n* = 76) *M* (*SD*)	9 (*n* = 3) *M* (*SD*)	All (*n* = 154) *M* (*SD*)
		Step Counts		
VB Music	1671 (644)	1718 (693)	1462 (574)	1690 (664)
VB No Music	1287 (627)	1492 (528)	874 (111)	1382 (586)
BB Music	2897 (979)	2777 (837)	2955 (471)	2839 (905)
BB No Music	2600 (832)	2388 (808)	2524 (805)	2494 (821)
		Time in Activity		
VB Music	18.2 (5.8)	18.7 (6.5)	16.6 (6.1)	18.4 (6.1)
VB No Music	15.3 (7.3)	16.8 (5.2)	11.5 (2.1)	16 (6.4)
BB Music	28.7 (7.4)	27.3 (6.2)	28 (4.2)	28 (6.8)
BB No Music	25.6 (5.7)	24.8 (7.4)	25.6 (7.7)	25.2 (6.6)
		Level of Enjoyment		
VB Music	4.58 (.64)	4.47 (.72)	4 (1)	4.51 (.69)
VB No Music	4.1 (.91)	3.81 (1.02)	3 (-)	3.94 (.97)
BB Music	4.31 (.77)	3.95 (.92)	5 (-)	4.14 (.86)
BB No Music	3.92 (1.01)	3.34 (1.04)	3.33 (1.15)	3.62 (1.06)

Note. VB = volleyball; BB = basketball.

Table 2
Descriptive Statistics for Males in Their Respective Grades for Step Grades for Step Counts for Study 1

Activity/ Condition	Grade 7 (*n* = 80) *M* (*SD*)	8 (*n* = 69) *M* (*SD*)	9 (*n* = 2) *M* (*SD*)	All (*n* = 151) *M* (*SD*)
		Step Counts		
VB Music	3264 (1143)	3046 (771)	3788 (1296)	3174 (995)
VB No Music	3086 (1064)	3176 (921)	3454 (1434)	3133 (998)
BB Music	3116 (753)	3282 (767)	3673 (241)	3199 (758)
BB No Music	3127 (826)	2804 (645)	3098 (-)	2979 (760)
		Time in Activity		
VB Music	31.9 (8.3)	28.8 (5.4)	36 (8.4)	30.6 (7.3)
VB No Music	29.7 (8.4)	32 (7.8)	34 (8.4)	30.8 (8.1)
BB Music	27.8 (5.3)	29.8 (7.2)	35 (-)	28.8 (6.3)
BB No Music	28 (6.4)	26.5 (5)	28 (-)	27.3 (5.8)
		Level of Enjoyment		
VB Music	4.11 (1.04)	4.29 (.9)	3 (-)	4.18 (.98)
VB No Music	4.13 (1.03)	3.78 (1.12)	2.5 (.7)	3.95 (1.09)
BB Music	4.34 (.82)	4.11 (1.08)	4 (-)	4.23 (.94)
BB No Music	4.21 (.93)	3.98 (1.04)	3 (-)	4.09 (.99)

Note. VB = volleyball; BB = basketball.

Table 3
Descriptive Statistics for Step Counts, Time in Activity, and Combined Gender and Grade From Study 1

Activity/ Condition	*M*	*SD*	*N*
	Step Counts		
VB Music	2393	1118	268
VB No Music	2227	1193	259
BB Music	3012	855	285
BB No Music	2728	827	271
Total	2600	1050	1083
	Time in Activity		
VB Music	24	9	268
VB No Music	23	10	259
BB Music	28	6	285
BB No Music	26	6	271
	Level of Enjoyment		
VB Music	4.3	.8	268
VB No Music	3.9	1	259
BB Music	4.1	.9	285
BB No Music	3.8	1	271
Total	4.1	.9	1083

Note. VB = volleyball; BB = basketball.

MANOVA Omnibus Test

Also in this study, a MANOVA omnibus test indicated significant differences between conditions (music/no music), λ (3, 1057) = .222, $p < .001$; activities (basketball/volleyball), λ (9, 2572) = .97, $p < .001$; gender, λ (3,1057) = .932, $p < .001$; and grade, λ (6, 2114) = .975, $p < .001$.

A significant interaction effect was found between gender and activity, λ (9, 2572.61) = .966, $p < .001$, and between grade and activity, λ (18, 2990.13) = .971, $p < .05$. No significant interaction effects

were found between gender and grade, λ (6, 2114) = .991, $p > .05$, or among gender, grade, and activity, λ (18, 2990.13) = .984, $p > .05$.

Follow-up ANOVAs indicated a significant gender effect in steps taken, $F(1, 1059) = 68.687$, $p < .001$; time in activity, $F(1, 1059) = 61.234$, $p < .001$; and level of enjoyment, $F(2, 1059) = 12.205$, $p < .001$. Follow-up ANOVAs indicated a significant activity type effect in steps taken, $F(3, 1059) = 7.291$, $p < .001$; time in activity, $F(3, 11059) = 5.234$, $p < .001$; and level of enjoyment, $F(3, 1059) = 4.543$, $p < .001$. Results also indicated an interaction between gender and type of activity, $F(3, 1059) = 8.013$, $p < .001$, with boys taking more steps than girls did in both activities. Further, boys spent significantly more time than girls did in activity, $F(3, 1059) = 10.952$, $p < .001$, in volleyball. Last, there was a significant interaction between grade and activity type, $F(6, 1059) = 2.313$, $p < .05$, with seventh grade students showing the highest levels of enjoyment.

Post Hoc Comparisons: Tukey's HSD

In this study, a Tukey's HSD test revealed significant differences in step counts and time in activity between activities with and without music. Basketball with ($M = 3012$, $SD = 85.9$) or without ($M = 2728$, $SD = 827.2$) music resulted in more steps than did volleyball with ($M = 2393$, $SD = 1118.3$) or without ($M = 2227$, $SD = 1193.7$) music.

Results indicate a similar pattern with time in activity. Basketball with ($M = 28.4$, $SD = 6.5$) or without ($M = 26.2$, $SD = 6.3$) music resulted in more time in activity than did volleyball with ($M = 24.2$, $SD = 9.0$) or without ($M = 23.1$, $SD = 10.4$) music. Also, basketball with music ($M = 28.4$, $SD = 6.5$) resulted in significantly more time in activity than did basketball without music ($M = 26.2$, $SD = 6.3$). Last, results indicate that level of enjoyment was higher in volleyball with music ($M = 4.3$, $SD = .86$) than either volleyball ($M = 3.9$, $SD = 1.0$) or basketball without ($M = 3.8$, $SD = 1.1$) music.

Discussion

The purpose of this study was to examine and report the effects of music in junior high school PE classes. The researchers investigated popular music on physical activity rates (steps counts and time in activity), via pedometers, of junior high PE students. From this study, the data indicate that significant differences were noted between gender and activity type causing that the activities with music

to increase steps taken and time in activity. It was found that the activities with music increased steps taken and time in activity for both males and females. The findings from this study concur with the study conducted by Barney and Prusak (2015). In their study with elementary-aged students in a PE setting, they found that when music was being played in the class activities, student step counts significantly increased in the activities for both genders. The activities used in the Barney and Prusak study were walking and Frisbee activities. The results from both of these studies strongly imply that music can positively affect student activity, despite gender, in PE class. Thus, aside from the inherent differences in basketball and volleyball, music positively affected the steps taken and time in activity.

It can be inferred that significant differences in step counts were found between activity types because, by nature, basketball requires higher intensity or more movement to participate and thus more steps were found in basketball compared to volleyball whether or not music was played. Significant differences in step counts, however, were noted between basketball with music and without music. This suggests that music does play a role in increasing step counts. Similar to the results in Barney and Prusak's (2015) study, the results in this study showed that music had a more pronounced effect on basketball than on volleyball in steps taken because it was a higher intensity activity. It appears music affects higher intensity activities more so than it does less intense activities. This may have occurred because the music played was of a fast tempo, which is similar to the fast-paced nature of the sport of basketball.

For comparisons between activity types, significant differences were noted in time in activity between volleyball with music and basketball with music, between volleyball without music and basketball with music, and between volleyball without music and basketball without music. These significant differences may be explained by the nature of basketball compared to the nature of volleyball. Basketball, regardless of music or no music, is more intense and requires more movement by nature, as there are few moments of pausing within the game. On the other hand, volleyball is less intense by nature, as it includes many built-in pauses throughout the game when the volleyball is chased down, when the ball is on the other side of the net, in between serves, or simply when the game does not require everyone to move, as only three touches are allowed per side.

Previous research studies have revealed that the fast tempo music (120–160 BPM) increases workload intensity (Priest et al., 2004; Karageorghis et al., 2006) and increases the time a person works out (Elliott, Carr, & Savage, 2004; Macone, Baldari, Zelli, & Guidetti, 2006). Barney, Gust, and Liguori (2012) found similar results with college-aged students. The researchers studied college students who listened to their MP3 player while they worked out at the campus fitness center. For this study, students were surveyed. The college students were asked what type of music they listened to while they worked out, what mode of exercise they participated in while they worked out, why they listened to an MP3 player when they worked out, and the frequency of the students' workout with music. The college students perceived that the MP3 player helped them to work out more frequently, more intensely, and for longer durations. The results from this study, along with other studies, make a strong case for physical educators to implement music during their lessons for the purpose of increasing physical activity.

One last finding from this study was the level of enjoyment the students experienced as they participated in both activities as music was being played. Both the male and female students felt that the music made their experience of participation more enjoyable. Digelidis, Karageorghis, Papapavlou, and Papaioannou (2014) studied the effects of music on lesson satisfaction and on four types of motivation of high school students. They found that high school students had lower levels of satisfaction with the lessons when no music was played. The researchers concluded that when music is played during the lessons it creates a pleasant atmosphere and thus is likely to motivate students to engage in the task with greater intensity.

Another variable that indicated student level of enjoyment was the number of steps the students took during both activities. Students took more steps in both activities as music was being played as previously mentioned. The researchers observed that during the collection of the volleyball data, students would move to the music in between points. It was also noted that students would ask both physical educators to play music on the days music was not played when they played both activities. The data and the types of observations from the researchers coincide with the conceptual framework dealing with music in a physical activity setting (Karageorghis et al.,

1999). The junior high school students were affected by the rhythm rate; the tempo of the music increased their activity.

Conclusions

The findings from this study help increase and strengthen the literature for the betterment of increasing physical activity in junior high school PE classes. The results of this study appear to coincide with the tenets of Karageorghis et al.'s (2006) conceptual theory regarding music and physical activity. The conceptual theory for these studies states that music can affect a person's physical activity. The areas in which music can affect physical activity are (a) rhythm response, (b) musicality, (c) cultural impact, and (d) association. Because of the type of music (rhythm response) used in this study, most notably the tempo or speed of the music, students' steps and time in activity increased. These results are in agreement with previous research findings that music increases student output during physical activity (Barney & Prusak, 2015; Deutsch & Hetland, 2012; Karageorghis et al., 2006).

The findings from this study bare the fact that students who played during game play with music playing had significantly more steps and more time in activity than did student who played during game play with no music. Having students in activity for more than half the class period is an objective that physical educators want to achieve (Malina, 1996). Music is a tool that can assist physical educators in meeting the objective of having students in physical activity for a majority of class time. The findings from these studies should hint to physical educators at all levels of implementing music in game play situations during class. Chen (1985) said, "Just play some music with a definite beat and watch as little ones respond with the joy of moving in space" (p. 19). Even though Chen is singling out small children, the same can apply to any person of any age. Music can move us, and this can also apply to music being played during junior high PE classes and game play in college basketball classes.

Study Limitations

The investigators have noted a number of limitations placed upon the study. For this study, the participants came from one junior high school. Because the participants came from one school, it may

not allow a representative sampling of junior high school students in other junior high schools or in other geographic regions, thus limiting the generalizing of the findings. In addition, the participants came from segregated classes, all male and all female classes, as compared to nonsegregated classes.

References

Barney, D., Gust, A., & Liguori, G. (2012). College students' usage of personal music players (pmp) during exercise. *ICHPER*SD Journal of Research, 7,* 23–26.

Barney, D., Mauch, L., & Pleban, F. (2008). Measuring pedometer step counts in four curriculum units in middle school physical education. *ICHPER*SD Journal of Research, 3,* 43–47.

Barney, D., & Prusak, K. (2015). The effects of music on physical activity rates on elementary physical education students. *The Physical Educator, 72,* 236–244.

Chen, P. (1985). Music as a stimulus in teaching motor skills. *New Zealand Journal of Health, Physical Education, & Recreation, 18*(3), 19–20.

Copeland, B. L., & Frank, B. D. (1991). Effects of types and intensities of background music on treadmill endurance. *The Journal of Sports Medicine and Physical Fitness, 31,* 100–103.

Deutsch, J., & Hetland, K. (2012). The impact of music on pacer test performance, enjoyment, and workload. *Asian Journal of Physical Education & Recreation, 18*(1), 6–14.

Digelidis, N., Karageorghis, C. I., Papapavlou, A., & Papaioannou, A. G. (2014). Effects of asynchronous music on students' lesson satisfaction and motivation at the situational level. *Journal of Teaching in Physical Education, 33,* 326–341. https://doi.org/10.1123/jtpe.2013-0120

Elliott, D., Carr, S., & Savage, D. (2004). Effects of motivational music on work output and affective responses during sub-maximal cycling of a standardized perceived intensity. *Journal of Sport Behavior, 27,* 134–147.

Karageorghis, C. I., Jones, L., & Low, D. C. (2006). Relationship between exercise heart rate and music tempo preference. *Research Quarterly for Exercise and Sport, 77,* 240–250. https://doi.org/10.1080/02701367.2006.10599357

Karageorghis, C. I., & Terry, P. C. (1997). The psychophysical effects of music in sport and exercise: A review. *Journal of Sport Behavior, 20*(1), 54–68.

Karageorghis, C. I., Terry, P. C., & Lane, A. M. (1999). Development and initial validation of an instrument to assess the motivational qualities of music in exercise and sport: The Brunel Music Rating Inventory. *Journal of Sports Sciences, 17,* 713–724. https://doi.org/10.1080/026404199365579

Macone, D., Baldari, C., Zelli, A., & Guidetti, L. (2006). Music and physical activity in psychological well-being. *Perceptual Motor Skill, 103,* 285–295. https://doi.org/10.2466/pms.103.5.285-295

Malina, R. M. (1996). Tracking of physical activity and physical fitness across the lifespan. *Research Quarterly for Exercise and Sport, 67,* 48–57. https://doi.org/10.1080/02701367.1996.10608853

Priest, D. L., Karageorghis, C. I., & Sharp, N. C. C. (2004). The characteristics and effects of motivational music in exercise settings: The possible influence of gender, age, frequency of attendance, and time of attendance. *The Journal of Sports Medicine and Physical Fitness, 44,* 77–86.

USA School Info. (2013). Retrieved December 12, 2013, from http://www.usaschoolinfo.com/

Ward, P., & Dunaway, S. (1995). Effects of contingent music on laps run in a high school physical education class. *The Physical Educator, 52,* 2–7.

The Physical Educator Vol. 73 • pp. 704–718 • 2016
https://doi.org/10.18666/TPE-2016-V73-I4-6818

PEDAGOGY

Preservice Physical Education Teachers' Technological Pedagogical Content Knowledge

Kristin Scrabis-Fletcher, Susana Juniu, Eric Zullo

Abstract

Effective technology integration within all areas of education is an objective in most schools given the amount of time students are using technology personally and at school. PE teachers have been challenged to find innovative ways to integrate technology to enhance student learning. A specific type of knowledge is necessary for integration entitled technological pedagogical content knowledge (TPACK; Koehler & Mishra, 2008). TPACK provides the theoretical framework for this study and defines the type of knowledge PETE candidates must possess to be prepared to meet the needs of their students and national and state standards. Online instrumentation of a modified version of Pre-Service Teachers' Knowledge of Teaching and Technology (Semiz & Ince, 2012) was completed by 91 preservice PETE candidates from several universities in the Northeast. A 5-point Likert-type scaling technique and open-ended responses were used on the 39-item inventory to assess the seven types of knowledge that PETE candidates may possess, along with specific open-ended questions regarding modeling of technology by professors, cooperating teachers, and what the PETE candidates have used thus far. Analyses revealed a significant association between the amount of TPACK that preservice teachers

Kristin Scrabis-Fletcher is an assistant professor, Department of Exercise Science and Physical Education, Montclair State University. Susana Juniu is department chair and professor, Department of Exercise Science and Physical Education, Montclair State University. Eric Zullo is a health and physical education teacher, Rumson School District. Please send author correspondence to kasf29@gmail.com

perceived having and the technology that PETE faculty modeled, including various methods for implementation. Open-ended responses indicated that PETE faculty were likely to use traditional forms of technology (PowerPoint and video); however, cooperating teachers were using more current technology including SMART Boards and iPads. This study has shown that PETE programs are creating opportunities for technology to be integrated; however, more examples using current technologies need to be modeled by PETE faculty and cooperating teachers. Therefore, preservice teachers will be well trained in implementing technology within a lesson.

Implementing technology within all areas of education is an objective that can be found in strategic plans at all levels of education. Embedded within the 2008 National Initial Physical Education Teacher Education Standards (National Association for Sport and Physical Education [NASPE], 2009), Standard 3: Planning and Implementation states that physical education candidates must "demonstrate knowledge of current technology by planning and implementing learning experiences that require students to appropriately use technology to meet lesson objectives" (NASPE, 2008, p. 2). This creates a need for PETE programs to find ways to integrate technology into their courses while supplying PETE candidates with appropriate learning experiences with technology. Learning experiences need to include not only content knowledge regarding technology, but also pedagogical knowledge of implementation in planning and executing lessons in which technology is used appropriately (Arslan, 2015).

Previous research has shown that physical education teacher education (PETE) candidates possess a positive attitude for technology (Gotkas, 2012) and that the more they are exposed to technology, the greater their affinity for implementing it (Clapham, Sullivan, & Ciccomascolo, 2015; Ince, Goodway, Ward, & Lee, 2006; Kul, 2013). Males and females have shown similar amounts of technology use (Kul, 2013); however, females use it more for games and practice (Yaman, 2008). PETE programs need to capitalize on this inherent motivation and use and adapt to meet the technological needs of their students (Arslan, 2015). By doing this, PETE programs will be moving toward meeting the national standard requiring implementation of technology to meet lesson objectives (NASPE, 2009).

Prior research has shown that using technology (heart rate monitors, pedometers, apps) can increase activity in physical education (Clapham et al., 2015; Duncan, Birch, & Woodfield, 2012) and increase student learning (Woods, GocKarp, & Hui, 2008). With school districts adopting more resources for technology such as SMART Boards, iPads, and Chromebooks, physical education teachers have more access to technology that can be integrated into their classrooms and gymnasia to enhance instruction, assist with assessment, and create more efficiency in record keeping. NASPE (2009) provided a position statement delineating specific guidelines for technology integration in physical education. These guidelines provide a framework for how to use technology within physical education so it is effective and can supplement and enhance the learning goals, while working toward meeting the national and state standards for physical education. PETE programs are encouraged to be active in introducing and integrating technology resources that assist in meeting lesson objectives and positively affect student learning.

Previous research suggests that effective technology integration with specific subject matter requires teachers to apply their knowledge of curriculum content, general pedagogies, and technologies (Koehler, Mishra, & Yahya, 2007; Roth, 2014). This approach, known as the "technological pedagogical content knowledge" (TPACK) model (Koehler & Mishra, 2008), is grounded in Shulman's (1987) concept of teacher knowledge. Shulman (1987) suggested that a teacher needs to possess (a) content knowledge, (b) pedagogical knowledge, and (c) pedagogical content knowledge (see Table 1). These areas of knowledge do not exist in isolation, but need to work in unison so the teacher can create an optimal learning environment (Roth, 2014). PETE programs are responsible for supplying PETE candidates with all three types of knowledge in a variety of areas, including technology.

Table 1
Definitions of Types of Knowledge

Type of knowledge	Definition
Content Knowledge (CK)	Knowledge about the subject matter that is to be learned or taught
Pedagogical Knowledge (PK)	Knowledge about the processes and practices or methods of teaching
Technology Knowledge (TK)	Knowledge about both standard and advanced technologies
Pedagogical Content Knowledge (PCK)	Knowledge of pedagogy that is applicable to the teaching of specific content (Shulman, 1986)
Technological Content Knowledge (TCK)	Knowledge about the manner in which technology and content influence and constrain one another
Technological Pedagogical Knowledge (TPK)	Knowledge about how teaching and learning change when particular technologies are used
Technological Pedagogical Content Knowledge (TPACK)	Knowledge that emerges from an understanding of content, pedagogy, and technology knowledge

The TPACK model suggests that the technology employed must also work in conjunction with pedagogical knowledge and content-specific knowledge to enhance instruction and be appropriate to the characteristics of the students and the learning environment (Koehler & Mishra, 2008). In physical education, contextual factors may be a challenge for physical educators when integrating technology (Roth, 2014). There are inherent contextual factors to teaching physical education such as not always having access to a power source or WiFi, especially if physical educators are teaching outside or in the gymnasium, which may limit opportunities and methods of integration. The safety of devices may also be an issue given the nature of how lessons are designed and the dynamic environment of physical education. These factors need to be addressed accordingly.

Because physical education is usually taught in a gymnasium or outdoors, it is important for PETE programs to prepare teachers to infuse technology in a way that will support the pedagogical strategies used in those settings. Teachers need to learn and practice teaching skills in a context as similar as possible to the one they will teach in later. For example, using exercise equipment to assess physical activity (e.g., accelerometers, iPads, heart rate monitors, pedometers, interactive dance machines), body composition (e.g., bioelectrical impedance devices, electronic skinfold calipers), and video analysis equipment used for analyzing movement and motor skill performance. Physical education programs need to integrate technology, and physical educators need to think creatively, employing their TPACK, for opportunities to integrate technology to create enriching learning experiences for their students (Pyle & Esslinger, 2014).

PETE programs are responsible for creating opportunities for PETE candidates to use technology within their classes and to develop their TPACK. Previous research has shown that PETE candidates possess a positive attitude for technology (Gotkas, 2012) and that the more exposure they have to technology, the greater their affinity for implementing it (Clapham et al., 2015; Ince et al., 2006; Kul, 2013). PETE programs need to capitalize on this and adapt to meet the technological needs of their students (Arslan, 2015). Finding ample appropriate methods for instructing preservice teachers about technology is a challenge that many programs face. The purpose of this study was to examine preservice PETE candidates' technological and pedagogy skills and their beliefs about and implementation of technology in their classes in an effort to assess which methods of instruction about technology might provide for the greatest learning. The following research questions were addressed in this investigation:

- What was the technology literacy level of PETE candidates?
- What was the relationship between the technological pedagogical content knowledge and the students' perceptions of professors modeling computer use?
- What were the differences between PETE candidates based on gender on their technological pedagogical content knowledge?

Method

Participants

This study was descriptive in nature. The participants in this study included 91 preservice PETE candidates from 11 universities located in the Northeast. After IRB approval was ascertained, letters were e-mailed to the physical education program chairs/coordinators at each university asking if they would agree to have their PETE candidates participate in the study. Once confirmation of agreement to participate was received, a letter explaining the study was e-mailed to the program chair/coordinator, which they then directly e-mailed to the PETE candidates within their program. PETE candidates were reminded that their responses would be anonymous and participation was voluntary and had no bearing on their academic success. A link to the online survey that allowed them access to participate in the study online was included in the PETE candidate e-mail.

Demographics

Study materials were placed online using an online survey program. Once participants read the consent form and agreed to participate, they were then taken directly to a demographic sheet and survey instrument. The demographic questions included gender; age range; year in college; if they completed a K–12 practicum experience; and if they planned on student teaching, what semester they would be conducting that.

Instrument

A modified version of the original Survey of Pre-Service Teachers' Knowledge of Teaching and Technology (TPACK; Schmidt et al., 2009) was used to ascertain PETE candidates' knowledge regarding technology. The modified version (Semiz & Ince, 2012) included changes to the wording to be specific to physical education. The instrument assesses seven types of technology knowledge including content knowledge, pedagogical knowledge, technology knowledge, pedagogical content knowledge, technological content knowledge, technological pedagogical content knowledge, and technological pedagogical content knowledge. See Table 1 for definitions of the types of knowledge. Internal consistency coefficients (Cronbach's al-

pha) for TPACK subscales were 0.85 for Technological Knowledge (TK), 0.79 for Content Knowledge (CK), 0.89 for Pedagogical Knowledge and Pedagogical Content Knowledge (PK + PCK), 0.77 for Technological Pedagogical Knowledge and Technological Content Knowledge (TPK + TCK), 0.85 for Technological Pedagogical Content Knowledge (TPCK), and last, 0.94 for the whole TPACK survey, therefore demonstrating instrument validity.

The instrument uses a 5-point Likert-type scaling technique addressing statements for which participants choose whether they *strongly agree* or *strongly disagree*. See Table 2 for examples of questions. At the end of the instrument, there are three open-ended questions for which participants are asked to specify examples (a) when they had seen appropriate content, technology, and pedagogy modeled by a professor; (b) when they had seen appropriate content, technology, and pedagogy modeled by a cooperating teacher; and (c) when they had personally modeled pedagogy by combining content and technology.

Table 2
Sample Questions From the Modified Pre-Service Teacher's Knowledge of Teaching and Technology Survey

Questions	Scale
I know how to solve my own technical problems.	5 4 3 2 1
I am thinking critically about how to use technology in the classroom	5 4 3 2 1
I can choose technologies that enhance the content for a lesson	5 4 3 2 1
My professors outside of education appropriately model combining content, technologies, and teaching approaches in their teaching	5 4 3 2 1

Note. 5 = *strongly agree;* 4 = *agree;* 3 = *uncertain;* 2 = *disagree;* 1 = *strongly disagree.*

Several independent variables were used throughout data analysis including *gender* (male and female), *college year status* (freshman, sophomore, junior, senior, graduated, post-BA), and *enrolled in the*

teacher education program (yes and no). The dependent variables assessed in this study included students' content knowledge, pedagogical knowledge, technological knowledge, pedagogical content knowledge, technological content knowledge, and technological pedagogical content knowledge (TPACK), and students' perception of professors modeling the implementation of technology in their classes.

Data Analysis

Ninety-one complete responses were recorded and analyzed using the Statistical Package for the Social Sciences (SPSS 21). Descriptive analyses were performed on all dependent variables. Independent samples *t* tests were used to compare differences between gender and between students enrolled in the program on the variables related to knowledge acquired during coursework and perception of professors modeling computer use. Chi-square tests were conducted to examine the association between students' types of knowledge and model of TPACK by faculty.

Findings

Frequency and percentage data of the responses indicated that 55 participants were males and 36 respondents were females. Of the 91 students, 44 were enrolled in the program and 47 were not enrolled.

Differences Between Males and Females

A *t* test ($\alpha = .05$) was conducted to evaluate differences between male and female students' technological content knowledge. From the results, it can be concluded that there is a statistically significant difference between male and female students' technological content knowledge, $t(88) = -2.146, < .05$. It can be further concluded that male students ($\bar{X} = 3.48$) were more likely to have more technological content knowledge than were female students ($\bar{X} = 3.43$).

Differences Between Students in the Program and Students Not in the Program

A *t* test was conducted to evaluate differences in pedagogical knowledge between students in the program and students not in the program. The *t* test results indicated that students in the program ($\bar{X} = 4.21$) were likely to have more pedagogical knowledge, $t(88) =$

-2.346, < .05, than were students not in the program yet ($\bar{x}$ = 3.95). From the results, it can be concluded that there is a statistically significant difference between the students in the program and those not in the program

Association Between Type of Knowledge and Model of TPACK by Faculty

The association between *pedagogical knowledge* and *model of TPACK by faculty* was significant, χ^2 (6, N = 90) = 18.991, p < 0.01. Thirty-six out of 90 students agreed that their pedagogical knowledge was associated to professors modeling computer use in the classroom.

The association between *pedagogical content knowledge* and *model of TPACK by faculty* was significant, χ^2 (9, N = 89) = 26.389, p < 0.01. Thirty-three out of 89 preservice teachers perceived that the amount of pedagogical content knowledge was associated to professors modeling computer use in the classroom.

The association between *technological content knowledge* and *model of TPACK by faculty* was significant, χ^2 (9, N = 89) = 52.711, p < 0.001. Thirty-five out of 90 students agreed that their *technological content knowledge* was associated to professors modeling computer use in the classroom.

The association between *technological pedagogical content knowledge* and *model of TPACK by faculty* was significant, χ^2 (9, N = 90) = 32.252, p < 0.001. Forty-two out of 90 students agreed that their *technological pedagogical content knowledge* was associated to professors modeling computer use in the classroom.

There was an association between *technological pedagogical content knowledge* and *the PETE faculty modeled* including various methods for implementation, χ^2 (12, N = 89) = 61.738, p < 0.01.

Data analyses revealed a significant association between the amount of TPACK preservice teachers perceived having and the technology that PETE faculty modeled, including various methods for implementation. These results are supported by 50% of the students agreeing that over 60% of the PETE faculty provided an effective model of combining content, technologies, and teaching approaches in their teaching. Fifty-nine percent of the respondents indicated that 50% or more of their PETE professors provided an ef-

fective model of combining content, technologies, and teaching approaches in their teaching.

Forty-four percent of the respondents perceived that 50% or more of their cooperating teachers provided an effective model of combining content, technologies, and teaching approaches in their teaching.

Thirty-five percent of the respondents perceived that professors outside the PETE program provided an effective model of combining content, technologies, and teaching approaches in their teaching.

Results of a linear regression analysis conducted to predict *technological pedagogical content knowledge* based on *faculty model of TPACK* show a significant equation, $F(3, 86) = 15.40$, $p < .01]$ with an R^2 of .35. It was found that *model of TPACK by faculty* predicted *technological pedagogical content knowledge* ($\beta = .586$, $p < .001$). It can be concluded that faculty modeling of TPACK explains the students' technological pedagogical content knowledge regardless if the student was or was not in the program.

Types of Technology Modeled by Professors

After the open-ended responses were examined, the frequencies and percentages were calculated for the types of technology modeled by professors, the types of technology modeled cooperating teachers, and what PETE candidates had implemented. Results indicated that PowerPoint was the most common type of technology being modeled and implemented by all three groups (41.90%, 38.00%, and 45.80%, respectively). Apps specifically designed for physical education were used infrequently by professors (6.40%), and SMART Boards were used in schools and by PETE candidates, however at a low frequency (14.20% and 8.30%, respectively). Similar technologies modeled by cooperating teachers were observed as being implemented by PETE candidates. See Table 3 for more results.

Table 3
Type of Technology Modeled

Type of technology	Frequency	%
Type of technology modeled by professor or instructor		
PowerPoint/Prezi	13	41.90
Heart rate monitors	7	22.50
Videos	6	19.30
PE apps	2	6.40
Other (wikis, EMG, music)	5	16.10
Type of technology modeled by cooperating teacher		
Video (YouTube, animation)	5	23.80
PowerPoint	8	38.00
SMART Board	3	14.20
Music	3	14.20
Other (Wii Fit, Kinect, iPad)	2	9.50
Type of technology implemented by preservice teacher		
Video (YouTube, animation)	5	20.80
PowerPoint	11	45.80
SMART Board	2	8.30
Music	3	12.50
iPad	3	12.50

Discussion

This study examined preservice PETE candidates' technological and pedagogy skills and their beliefs about and implementation of technology in their classes in an effort to assess which methods of instruction about technology might provide the greatest learning. The results of this investigation provide information about ways to integrate technology in physical education that will assist in creating more efficiency and greater understanding of concepts. If a teacher uses an iPad for assessment or demonstrates skill analysis in real time on a SMART Board, along with having students practice the skill within progressive learning tasks, and follow up with an online learning assignment for homework, students will gain a deeper understanding of content (Woods et al., 2008). Student success in

physical education has been shown to "increase with the aid of audiovisual materials" (Yaman, 2008, p. 2), therefore reinforcing the concept that blended learning, including technology, will increase student learning and satisfaction (Vernadakis, Giannousi, Tsitskari, Antoniou, & Kioumourtzoglou, 2013).

Previous research has shown that PETE teacher candidates possess a positive attitude about technology (Gotkas, 2012) and teachers develop a greater affinity for technology use if they have training (Gibbone, Rukavina, & Silverman, 2010; Ince et al., 2006). This study resonates with these findings and provides significant findings that technology is being used; however, equity is not always represented within implementation. Both males and females in this study possess technological content knowledge, but males reported greater content knowledge than females did, which may affect implementation. PETE programs need to ensure equity when discussing resources and expectations for integration. PETE candidates arrive in classes with motivation to integrate and use technology (Semiz & Ince, 2012); therefore, PETE programs need to cultivate this motivation and foster learning experiences for it to grow.

Overall, this study has shown that a sample of PETE programs is aligning more closely with NASPE's (2009) vision of technology integration in physical education. However, more examples of integration of current technologies need to be modeled more readily by PETE faculty and cooperating teachers. This may enhance TPACK for PETE candidates so they are well trained in implementing a variety of technologies within a lesson to enhance instruction and assessment.

Greater exposure to technology will increase PETE candidates' competence with technology and therefore yield greater implementation in the schools (Arslan, 2015). The knowledge acquired during coursework affects the students' preparation to integrate technology. Role modeling of a variety of specific technological skills is essential by PETE teachers and cooperating teachers during student teaching; however, it is lacking (Semiz & Ince, 2012). New methodologies need to be experimented with so that PETE students are well equipped to provide optimal learning experiences.

As technology changes, and because new advances are being made at such a quick pace, PETE faculty need to be conscious of the TPACK framework. They need to ensure that they are providing

many opportunities for technology integration in a variety of ways (Arslan, 2015). The TPACK framework helps to delineate what specific content knowledge, pedagogical knowledge, and technological knowledge is necessary to meet student needs. Professional development for PETE faculty regarding technology, along with mentoring, may assist them in gaining new ways to integrate technology and reduce anxiety related to technology in physical education (Martin, McCaughtry, Kulinna, Cothran, & Faust, 2008).

These findings may encourage PETE programs to seek effective ways to prepare high quality physical education teachers to meet the technological challenges in the gymnasium. In essence, the need resides in redirecting the educational strategies and in adopting new educational models to integrate technology that links the main components that intervene in the educational process. This includes the knowledge on the relations among the most appropriate technology (TK) and the most effective teaching (PK) to make the educational content (CK) more accessible to the students (Koehler & Mishra, 2008).

To optimize technology-based models of teaching and learning, PETE candidates should be able to apply the content knowledge in a pedagogically sound way that is adaptable to the characteristics of students and the educational context (e.g., the gymnasium). The key challenge is to prepare educators to incorporate technological features into the teaching and learning process effectively and efficiently. Educators need to make connections between the purpose of the educational technology and the learning outcome expected. Other recommendations include reviewing the physical education curriculum for each program to address the pedagogical uses of discipline-specific technologies and developing a digital environment appropriate to preservice physical education students.

References

Arslan, Y. (2015). Determination of technopedagogical content knowledge competencies of pre-service physical education teachers: A Turkish sample. *Journal of Teaching in Physical Education, 34,* 225–241. https://doi.org/10.1123/jtpe.2013-0054

Clapham, E., Sullivan, E., & Ciccomascolo, L. (2015). Effects of physical education supportive curriculum and technological devices on physical activity. *The Physical Educator, 72,* 102–116.

Duncan, M., Birch, S., & Woodfield, L. (2012). Efficacy of an integrated school curriculum pedometer intervention to enhance physical activity and to reduce weight status in children. *European Physical Education Review, 18,* 396–407. https://doi.org/10.1177/1356336X12450799

Gibbone, A., Rukavina, P., & Silverman, S. (2010). Technology integration in secondary physical education: Teachers' attitudes and practice. *Journal of Educational Technology Development and Exchange, 3*(1), 27–42.

Gotkas, Z. (2012). The attitudes of physical education and sport students towards information and communication technologies. *TechTrends, 56*(2), 22–32. https://doi.org/10.1007/s11528-012-0560-x

Ince, M., Goodway, J., Ward, P., & Lee, M. (2006). The effects of professional development on technological competency and the attitudes of urban physical education teachers toward technology. *Journal of Teaching in Physical Education, 25,* 428–440. https://doi.org/10.1123/jtpe.25.4.428

Koehler, M. J., & Mishra, P. (2008). Introducing TPCK. In AACTE Committee on Innovation and Technology (Ed.), *The handbook of technological pedagogical content knowledge (TPCK) for educators* (pp. 3–29). New York, NY: Routledge. https://doi.org/10.1016/j.compedu.2005.11.012

Koehler, M. J., Mishra, P., & Yahya, K. (2007). Tracing the development of teacher knowledge in a design seminar: Integrating content, pedagogy, and technology. *Computers & Education, 49,* 740–762.

Kul, M. (2013). Technology usage level of physical education and sports teachers in teaching activities. *International Journal of Academic Research, 5,* 102–108. https://doi.org/10.7813/2075-4124.2013/5-5/B.15

Martin, J., McCaughtry, N., Kulinna, P., Cothran, D., & Faust, R. (2008). The effectiveness of mentoring-based professional development on physical education teachers' pedometer and computer efficacy and anxiety. *Journal of Teaching in Physical Education, 27,* 68–82. https://doi.org/10.1123/jtpe.27.1.68

National Association for Sport and Physical Education. (2009). *Appropriate use of instructional technology in physical education* [Position statement]. Reston, VA: Author.

Pyle, B., & Esslinger, K. (2014). Utilizing technology in physical education: Addressing the obstacles of integration. *Educational Technology, X,* 35–59.

Roth, K. (2014). Technology for tomorrow' teachers. *Journal of Physical Education, Recreation, and Dance, 85*(4), 3–5. https://doi.org/10.1080/07303084.2014.884420

Schmidt, D. A., Baran, E., Thompson, A. D., Mishra, P., Koehler, M. J., & Shin, T. S. (2009, April). *Technological pedagogical content knowledge (TPACK): The development and validation of an assessment instrument for preservice teachers.* Paper presented at the annual meeting of American Educational Research Association, San Diego, CA.

Semiz, K., & Ince, M. (2012). Pre-service physical education teachers' technological pedagogical content knowledge, technology integration self-efficacy and instructional technology outcome expectations. *Australasian Journal of Educational Technology, 28,* 1248–1265. https://doi.org/10.14742/ajet.800

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15,* 4–14. https://doi.org/10.3102/0013189X015002004

Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review, 57,* 1–22. https://doi.org/10.17763/haer.57.1.j463w79r56455411

Vernadakis, N., Giannousi, M., Tsitskari, E., Antoniou, P., Kioumourtzoglou, E. (2013). A comparison of student satisfaction between traditional and blended technology course offerings in physical education. *Turkish Online Journal of Distance Education, 13*(1), 137–147.

Woods, M., GocKarp, G., & Hui, P. D. (2008). Physical educators technology competencies and usage. *The Physical Educator, 65*(2), 1–20.

Yaman, C. (2008). The abilities of physical education teachers in educational technologies and multimedia. *The Turkish Online Journal of Educational Technology, 7*(2), 20–31.

The Physical Educator Vol. 73 • pp. 719–732 • 2016
https://doi.org/10.18666/TPE-2016-V73-I4-6447

PHYSICAL ACTIVITY

Active Bodies/Active Brains: The Relationship Between Physical Engagement and Children's Brain Development

Deborah A. Stevens-Smith

Abstract

Educators often struggle daily with the issue of how to engage students for learning. Many instructional strategies are devoted to the concept of engagement to keep students interested and on task to enhance learning, but defining the term is difficult. Engagement may involve a combination of terms that relates to the effort of students when they devote themselves to purposeful activities (Krause & Coates, 2008). Advocates of physical engagement have known for years that movement enhances learning, but what has been missing is the research to support this belief. An increase in brain research now provides a definitive link connecting movement with the enhancement of learning. The purpose of this paper was to examine the relationship between physical engagement and the development of the mind–body connection, how physical engagement enhances that development, and the current research in the field that supports the construct.

Deborah A. Stevens-Smith is professor, Eugene T. Moore School of Education, Clemson University. Please send author correspondence to Stevens@Clemson.edu

Educators often struggle daily with the issue of how to engage students for learning. Often what is relevant or interesting for one student is the opposite for another. Many instructional strategies are devoted to the concept of engagement to keep students interested and on task to enhance learning, but defining the term is difficult. Engagement may involve a combination of terms that relates to the effort of students when they devote themselves to purposeful activities (Krause & Coates, 2008). Schaufeli (2013) stated that the term *engagement* involves three basic elements: physical, emotional, and cognitive. A single definition for engagement is not apparent, but the following definition represents an aggregation of the literature. "Engagement is seen to comprise active and collaborative learning, participation in challenging academic activities, formative communication with academic staff, involvement in enriching educational experiences, and feeling legitimated and supported by university learning communities" (Coates, 2007, p. 122).

A single component of the concept of engagement is active learning, which is the process of engaging students in the learning process through participation and reflection (Prince, 2004). Active engagement refers to the joint functioning of motivation, movement, conceptual knowledge, cognitive strategies, and social interactions in learning activities (Guthrie & Anderson, 1999). Rather than passively receiving the information, the student combines academic content with physical movements and skills to enhance learning. Research in this area supports the use of active engagement to enhance learning (Donnelly & Lambourne, 2011; Shephard & Trudeau, 2005). Teaching that emphasizes active engagement helps students process and retain information that may lead to higher student achievement. An old Chinese proverb that originated with Xun Kuand, a philosopher that lived from 312–230 B.C., is applicable: "Tell me, I forget, show me, I remember, involve me, I understand."

The term *physical engagement* will be used in this paper to combine the various types of active engagement that occur in the educational arena including the areas of recess, physical education/activity, play, and sport. The author understands that the individual terms have specific intents, but there is an overlapping context in using movement to enhance development. Each term involves a process that is carefully woven into the other to elicit a special type

of physical engagement that benefits the development of the whole child. As pressure continues to increase for students to perform well on high-stakes tests, educators will look to find ways to focus more time on academic learning for which physical engagement aids in developing active bodies and active minds.

Quality physical education programs provide a mixture of play, free time, physical enhancement, and structured teaching. A child who uses his or her body to form different letters of the alphabet works on different cognitive, social, and physical components to enhance development. The purpose of this paper was to examine the relationship between physical engagement and the development of the mind–body connection, how physical engagement enhances that development, and the current research in the field that supports the construct.

Development of the Mind–Body Connection

Our evolutionary ancestors, as a way of life, were used to walking up to 12 miles/day (Medina, 2008; Ratey, 2008). This pursuit for fitness was driven by a desire to survive through hunting and fishing. During most of our evolutionary history, very healthy bodies supported the development of our brains (Medina, 2008). Advances in modern society have pushed civilization into less activity with more opportunities and excuses to be stationary. The health benefits of physical activity are evident to most people, but despite this knowledge, most people worldwide are less active (Watkins, 2014). Individuals today are used to sitting in a classroom or office for 8 or more hours a day. Globally, only 1 in 3 people gets the recommended levels of physical activity, and this lack of physical activity contributes to chronic diseases (World Health Organization, 2011). Movement is like "cognitive candy" to our brains, and our brains can make a comeback: All we have to do is move (Medina, 2008).

The history of the mind–body connection can be traced back to ancient Greece and Rome when Hippocrates first combined science and philosophy to explain human behavior. Evidence of an essential link between the mind and the body originated with research from Leiner, Leiner, and Dow (1986), who proposed a new concept of how the cerebellar capabilities may contribute to mental skills. Leiner et al.'s (1986) research reconceptualized the cognitive map, which demonstrated the means by which people process their envi-

ronment, solve problems, and use memory (Richardson, Montello, & Hegarty, 1999).

Hannaford (2005) found evidence in brain scans that shows children learn best when they are active and moving because movement stimulates the neurons and electrical wiring that facilitate children's ability to take in information and learn. Part of this important link was established when researchers traced a pathway from the cerebellum to parts of the brain involved in memory, attention, and spatial perception (Jenson, 2000a). Researchers have found that the part of the brain that processes movement is the same part of the brain that processes learning.

President George W. Bush called the 1990s the decade of the brain (Jones & Mendell, 1999). Scientists learned more about the brain and how it worked during this span of years than they had learned in the previous 100 years. The year 1995 began the avalanche of studies on the effect of exercise and the brain. Scientists (Medina, 2008; Ratey, 2008) in the area of brain research have documented substantial evidence of a MAJOR connection between physical engagement in any form and the brain's performance. Medina (2008) looked at the role of exercise and how it affects learning with the basic premise that if a person wants to improve thinking skills, he or she must move. Sattelmair and Ratey (2009) discussed the evidence that physical activity improves academic performance, thus the need to reform current physical education programs. Educational practitioners are also weighing in on the issue and finding practical ways to use brain-based learning in the school environment (Jenson, 2000a; Moore & Sellers, 2014; Tokuhama-Espinosa, 2010; Wolfe, 2010).

Physical education, movement, drama, and the arts can all be used in an integrated theme for learning. Classroom teachers can have kids move in the classroom to learn academic content (brain breaks), and physical education teachers can include academic concepts in the teaching of physical activity (integrated lesson ideas). Educational systems continue to add various curricula to enhance intelligence, improve reading, encourage girls in math and science, and diversify education (National Association for the Education of Young Children & National Association of Early Childhood Specialists in State Departments of Education, 2003; Frede & Ackerman, 2007). To offer these additional curricula, administrators may push to elimi-

nate physical engagement from the school day. Anything deemed as a nontraditional subject such as art, music, recess, or physical education might be deemed unnecessary. Recent brain research suggests that this is a mistake, because the cerebellum is a virtual switchboard of cognitive activity (Medina, 2008) that can affect learning and development in a variety of ways.

Support for increased physical engagement now includes pediatricians (Limperopoulos et al., 2007), kinesiologists (Jenson, 2000a), and neuroscientists (Hannaford, 2005). Many schools are reducing physical engagement sessions because of time constraints, but some studies (Castelli, Hilman, Buck, & Erwin, 2007; Caterino & Polak, 1999; Wilkins et al., 2003) have linked activity with increases in cognitive development, and these studies will be reviewed in the research section below.

How Does Physical Engagement Facilitate Brain Development?

Researchers (Hannaford, 2005; Jenson, 2000b) have found that the brain uses the same connections to move that are used to process learning in reading, writing, and math. They have used electrode connections placed on a child's head and an elaborate computer program to map the areas of the brain being used during activities such as reading, calculating math, and physical engagement. They found with the different activities that certain areas of the brain light up, indicating activation of the brain. The areas that light up when the child reads or calculates math are the same areas that light up when the child is engaged in movement activity (Jenson, 2000b). The results provide insight into the connection between cognitive areas of the brain and how physical engagement can enhance learning connections.

Play theorist Brian Sutton-Smith (1997) believes that children are born with the capacity to develop a huge neuronal network that will die if not used. While children are physically moving they are developing neurological foundations that assist with problem solving, language development, and creativity. Physical engagement assists children in learning how to relate to others, adjust their muscles, and think abstractly. Through physical engagement, children develop a general mind-set of how to string bits of information together to

form solutions to problems and actually learn how to learn. In the physical realm, it is easy for children to understand that the more they practice a basketball shot or rehearse a dance performance, the more their skills improve. Students can also apply a similar principle in the cognitive area to understand that the brain responds in the same way. When a learner goes over multiplication facts or rereads confusing parts of a book, the brain gets better at processing this information. The two areas of learning can be combined for physical engagement so that the student practices a basketball shot five times and multiples the total by 2, 3, 4, 5, and so forth. When physical engagement and cognitive development are combined, the student increases the neurons that grow and connect to other neurons, so these neurons get more efficient at sending one another signals.

The ages between 3 and 11 are a time of rapid growth in multiple ways (social, intellectual, emotional, and physical). Brain activity during this time occurs at more than twice the rate than it does in the adult brain (Moore & Sellers, 2014). New synapses continue to form throughout life, but never again will the brain be able to master new skills or adapt to setbacks so easily (Ratey, 2008). Learning requires the creation of new neural connections, but the previous connections that have not been used are eliminated. It is a use it or lose it situation when it comes to neural connections. Every time a person moves in an organized manner, full brain activation and integration occurs and the door to learning opens naturally.

There is no doubt that childhood is about learning and the brain can develop without movement and physical engagement, but consequences may develop. Evidence exists that the removal of one or more sensory experiences early in life affects the ability of the brain to develop basic foundations needed for learning. Prescott's (1971) research on deprivation indicates that during the sensitive period of brain growth and development, conception to approximately 18 months of age, movement is as critical as good nutrition.

Basic neuroscience describes how the brain functions and grows as a result of physical engagement. The brain needs the basic elements of fresh oxygenated blood and water to be able to function effectively (Jenson, 2000a). The brain requires more oxygen than any other organ of the body does. The brain makes up only one fifteenth of the weight of the body, but it uses one fifth of the oxygen in the body (Blaydes, 2000). Oxygen is essential for learning. Movement

and physical engagement enable oxygen to be carried to the brain for efficient functioning and learning. This presents a problem in the current organization of educational settings. Children do a lot of sitting each day in class. Blaydes (2000) found that while a person sits, 80% of blood pools in the hips after just 20–30 min. If the blood is in the hips and not enhancing the brain, then learning becomes more difficult without the fresh oxygenated blood.

Ayres (1972), Gardner (1985), and Montessori (1948/1973) all espoused the importance of movement to the learning process. If physical educators desire is to create the best foundations to enhance learning in the early years, then physical engagement can enhance this development (Greenough & Black, 1992; Shatz, 1992). Using movement to increase learning affects the child in both the classroom and the physical environment (Jenson, 2000b; Ratey, 2008). The more connections a person has, the better and faster he or she becomes at using the information, solving problems, and thinking. The bottom line is that when physical educators provide physical engagement opportunities for children, they are developing not only the physical component of the child, but also the cognitive component (Hannaford, 2005).

Research That Supports the Relationship Between Learning and Physical Engagement

At the 1995 Annual Society of Neuroscience Conference, over 800 participants listened as a panel presented nearly 80 studies that suggest strong links between the cerebellum, memory, spatial perception, language, attention, emotion, nonverbal cues, and even decision making (Thach, 1996). Now with the advent of neuroscience, researchers are dedicated to understanding and exploring the connections between the brain and learning (Hannaford, 2005; Medina, 2008; Ratey, 2008). The research summarized below quantifies the results of the neuroscience findings that broadly conclude that (a) engagement in physical activity is associated with academic achievement, (b) cognitive performance improves significantly when children engage in movement activity, and (c) many of the social and physical benefits of movement are associated with success in school. The following is a summary of the research that supports these relationships:

- Students with higher fitness scores also had higher academic achievement. In 2002 and subsequent years, fit kids scored twice as well on academic tests as did their unfit peers (California Department of Education, 2005).
- Increasing physical activity and fitness is a promising approach to enhance brain development and cognition in children (Kirk, Hillman, & Kramer, 2015).
- Researchers in various academic and medical fields (from kinesiology to pediatrics) did a massive review of literature of more than 850 studies on the effects of physical activity on school-aged children and found that physical activity has a positive influence on memory, concentration, and classroom behavior (Janssen & LaBlanc, 2004).
- The relationship between physical fitness and academic performance in 259 third and fifth grade students showed a strong association between aerobic fitness and performance on standardized testing, grades, and other measures of cognitive performance (Castelli et al., 2007).
- Students who received daily physical education and movement showed the rate of learning per unit of time does not appear to increase. Using longitudinal studies, Shephard and Trudeau (2005) concluded that when 14%–26% of the curriculum is allocated for movement activity, learning occurs more rapidly. This premise also provides support that lack of curricular time is not a good reason to deny physical engagement activities (Shephard & Trudeau, 2005).
- In the School Health, Academic Performance, and Exercise study (SHAPE) conducted in Australia, Dwyer, Coonan, Leitch, Hetzel, and Baghurst (1983) looked at changes in math, reading, and fitness scores among children who were randomly assigned to fitness, skill, or regular physical education classes. The academic achievement of the groups in math and reading was the same, despite that students in the experimental groups spent over 75 min/day in physical education. The results support the premise that spending more time in physical engagement does not have a negative influence on academics (Dwyer, Coonan, Leitch, Hetzel, & Baghurst, 1983).

- Increasing time in physical education does not negatively influence academic achievement, and decreasing time in PE (as many principals believe) will not ensure that children perform better (Wilkins et al., 2003).
- The quantity and quality of physical participation support implications for increased academic performance (Caterino & Polak, 1999; Shephard & Trudeau, 2005; Symons, Cinelli, James, & Groff, 1997).
- There is increasing evidence for the association between physical activity, cardiovascular fitness, fatness, and cognitive function during childhood and adolescence. Evidence also suggests that these variables are linked to academic achievement (Donnelly & Lambourne, 2011).

Conclusion

Schools are under enormous pressure to demonstrate effectiveness in meeting standards in the core subjects. Most schools are not aware of or have not responded in a positive way to the research that supports physical engagement and cognitive enhancement. Research shows that people grow new brain cells through physical engagement and activity (Blaydes, 2000). When people learn something new, they enhance the development of new neural connections. Hannaford (2005) stated that if people increase active physical engagement participation, they increase movement, and they can increase neural growth in the brain. The more connections people have, the better and faster they become at using the information, solving problems, and thinking. The bottom line is that when physical educators provide movement opportunities for children, then they are developing not only the physical component of the child, but also the cognitive component.

There is an abundance of research that shows the benefits of physical engagement during the early childhood years (Brown & Vaughan, 2009; Freund, 2013; Goldstein, 2012). Even though parents and teachers recognize the value that physical engagement may add to the child's development, opportunities for physical engagement continue to diminish (Kuh & Cooper, 1992; Welk, 1998). There are fewer spaces, inhibited freedom to roam outdoors, and decreased time in school for play, recess, and physical education class (Goldstein, 2012). The case for physical engagement is clear, but the

question that remains is, what will we do to ensure children get the physical engagement they need to learn and grow?

Physical engagement truly is enjoyable work for children as they develop and build cognitive brain connections. The more active their bodies are, the more active their brains will become, and physical engagement is a facilitator of that development. The brain is involved in everything a person does, and to ignore it is irresponsible. Hopefully, as new findings continue to substantiate this vital link, schools will begin to implement the findings to enhance learning for all children.

References

Ayres, A. (1972). *Sensory integration and learning disorders.* Los Angeles, CA: Western Psychological Services.

Blaydes, J. (2000). *Thinking on your feet: How to make learning a moving experience.* Richardson, TX: Action Based Learning.

Brown, S., & Vaughan, C. (2009). *Play: How it shapes the brain, opens the imagination, and invigorates the soul.* New York, NY: Avery.

California Department of Education. (2005). *California physical fitness test: A study of the relationship between physical fitness & academic achievement in California using 2004 test results.* Retrieved from http://www.cde.ca.gov/ta/tg/pf/documents/2004pftresults.doc

Castelli, D., Hilman, C., Buck, S., & Erwin, H. (2007). Physical fitness and academic achievement in third-and fifth-grade students. *Journal of Exercise Psychology, 29,* 239–252. https://doi.org/10.1123/jsep.29.2.239

Caterino, M., & Polak, E. (1999). Effects of two types of activity on performance of second, third, and fourth grade students on a test of concentration. *Perceptual & Motor Skills, 89,* 245–248. https://doi.org/10.2466/pms.1999.89.1.245

Coates, H. (2007). A model of online and general campus-based student engagement. *Assessment and Evaluation in Higher Education, 32,* 121–141. https://doi.org/10.1080/02602930600801878

Donnelly, J., & Lambourne, K. (2011). Classroom-based physical activity, cognition, and academic achievement. *Preventive Medicine, 52,* 36–42. https://doi.org/10.1016/j.ypmed.2011.01.021

Dwyer, T., Coonan, W., Leitch, D., Hetzel, B., & Baghurst, R. (1983). An investigation of the effects of daily physical activity on the health of primary school students in South Australia. *International Journal of Epidemiology, 12,* 308–313. https://doi.org/10.1093/ije/12.3.308

Frede, E., & Ackerman, D. (2007). *Preschool curriculum decision-making: Dimensions to consider* (Preschool Policy Brief Issue 12). Retrieved from http://www.isbe.net/earlychi/pdf/preschool_curriculum.pdf

Freund, L. (2013). *Nurturing the developing brain in early childhood* [Slide show]. Bethesda, MD: The National Institutes of Health. Retrieved from http://www.smartstartga.org/images/pdf/eecpdf/novfreund.../freund.ppt

Gardner, H. (1985). *Frames of mind: The theory of multiple intelligences.* New York, NY: Basic Books.

Goldstein, J. (2012). *Play in children's development, health, and well-being.* Brussels, Belgium: Toy Industries of Europe.

Greenough, W., & Black, J. (1992). Induction of brain structure by experience: Substrates for cognitive development. In M. Gunnar & C. Nelso (Eds.), *Developmental behavioral neuroscience: The Minnesota Symposia on Child Psychology, Vol. 24.* (pp. 155–200). Hillsdale, NJ: Lawrence Erlbaum Associates.

Guthrie, J., & Anderson, E. (1999). Engagement in reading: Processes of motivated, strategic, knowledgeable, social readers. In J. Guthrie & D. Alvermann (Eds.), *Engaged reading: Processes, practices, and policy implications* (pp. 403–423). New York, NY: Teachers College Press.

Hannaford, C. (2005). *Smart moves: Why learning is not all in your head.* Arlington, VA: Great Ocean Publishers.

Janssen, I., & LaBlanc, I. (2004). Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity, 7,* 773–792.

Jenson, E. (2000a). *Brain based learning.* San Diego, CA: The Brain Store.

Jenson, E. (2000b). *Music with the brain in mind.* San Diego, CA: The Brain Store.

Jones, E., & Mendell, L. (1999). Assessing the decade of the brain. *Science, 284,* 739. https://doi.org/10.1126/science.284.5415.739

Kirk, E., Hillman, C., & Kramer, A. (2015). Brain and cognition. *Current Opinion in Behavioral Sciences, 4,* 27–32. https://doi.org/10.1016/j.cobeha.2015.01.005

Krause, K., & Coates, H. (2008). Students' engagement in first-year university. *Assessment and Evaluation in Higher Education, 33,* 493–505. https://doi.org/10.1080/02602930701698892

Kuh, D., & Cooper, C. (1992). Physical activity at 36 years: Patterns and childhood predictors in a longitudinal study. *Journal of Epidemiology and Community Health, 46,* 114–119. https://doi.org/10.1136/jech.46.2.114

Leiner, H., Leiner, A., & Dow, R. (1986). Cognitive and language functions of the human cerebellum. *Behavioral Neuroscience, 16,* 444–447.

Limperopoulos, C., Bassan, H., Gauvreau, K., Robertson, R., Sullivan, N., Benson, C., . . . duPlessis, A. (2007). Does cerebellar injury in premature infants contribute to the high prevalence of long-term cognitive, learning, and behavioral disability in survivors? *Pediatrics, 120,* 584–593. https://doi.org/10.1542/peds.2007-1041

Medina, J. (2008). *Brain rules: 12 Principles for surviving and thriving at work, home, and school.* Seattle, WA: Pear Press.

Montessori, M. (1973). *To educate the human potential.* Madras, India: Kalakshetra. (Original work published 1948)

Moore, J., & Sellers, T. (2014, August). *Practical applications of brain-based strategies to enhance learning.* Retrieved from http://www.polk-fl.net/staff/teachers/reading/documents/Read180Day2/Tuesday2/PracticalA%20_Moore/PracticalA%20_Moore%20%5bCompatibility%20Mode%5d.pdf

National Association for the Education of Young Children & National Association of Early Childhood Specialists in State Departments of Education. (2003). *Early childhood curriculum, assessment, and program evaluation: Building an effective, accountable system in programs for children birth through age 8* [Position statement]. Retrieved from https://www.naeyc.org/files/naeyc/file/positions/pscape.pdf

Prescott, J. (1971). Early somatosensory deprivation as an ontogenetic process in the abnormal development of the brain and behavior. In I. E. Goldsmith & J. Moor-Jankowski (Eds.), *Medical primatology* (pp. 356–375). Basel, Switzerland: Karger.

Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education, 93,* 223–231. https://doi.org/10.1002/j.2168-9830.2004.tb00809.x

Ratey, J. (2008). *Spark: The revolutionary new science of exercise and the brain.* New York, NY: Little, Brown and Company.

Richardson, A., Montello, D., & Hegarty, M. (1999). Spatial knowledge acquisition from maps and from navigation in real and virtual environments. *Memory and Cognition, 27,* 741–750. https://doi.org/10.3758/BF03211566

Schaufeli, W. B. (2013). What is engagement? In C. Truss, K. Alfes, R. Delbridge, A. Shantz, & E. Soane (Eds.), *Employee engagement in theory and practice* (pp. 15–35). London, England: Routledge.

Shatz, C. (1992, September). The developing brain. *Scientific American, 267*(3). https://doi.org/10.1038/scientificamerican0992-60

Shephard, R., & Trudeau, F. (2005). Lessons learned from the Trois-Rivières physical education study: A retrospective. *Pediatric Exercise Science, 15,* 243–256. https://doi.org/10.1123/pes.17.2.112

Sattelmair, J., & Ratey, J. (2009, Winter). Physically active play and cognition: An academic matter? *American Journal of Play, 1,* 365–374.

Sutton-Smith, B. (1997). *The ambiguity of play.* Cambridge, MA: Harvard University Press.

Symons, C., Cinelli, B., James, T., & Groff, P. (1997). Bridging student health risks and academic achievement through comprehensive school health programs. *Journal of School Health, 67,* 220–227. https://doi.org/10.1111/j.1746-1561.1997.tb06309.x

Thach, W. (1996). On the specific role of the cerebellum in motor learning and cognition: Clues from PET activation and lesion studies in man. *Behavior Brain Science, 19,* 411–431. https://doi.org/10.1017/S0140525X00081504

Tokuhama-Espinosa, T. (2010). *The new science of teaching and learning.* New York, NY: Teachers College Press.

Watkins, S. (2014). Critical review of healthy eating: Active living policies that shape the built environment. Retrieved January 6, 2015, from http://scottawatkins.com/critical-review-healthy-eating-active-living-policies-shape-built-environment/

Welk, G. (1998, February). *Youth fitness promotion across the lifespan.* Paper presented at the Administrative Issues in Youth Fitness Promotion Conference, Dallas, TX.

Wilkins, J., Graham, G., Parker, S., Westfall, S., Fraser, R., & Tembo, M. (2003). Time in the arts and physical education and school achievement. *Journal of Curriculum Studies, 35,* 721–734. https://doi.org/10.1080/0022027032000035113

Wolfe, P. (2010). *Brain matters: Translating research into classroom practice* (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

World Health Organization. (2011). New physical activity guidance can help reduce risk of breast, colon cancers. Retrieved from http://www.who.int/mediacentre/news/notes/2011/world_cancer_day_20110204/en/

The Physical Educator Vol. 73 • pp. 733–744 • 2016
https://doi.org/10.18666/TPE-2016-V73-I4-6977

PHYSICAL ACTIVITY

Children's Activity Levels and Lesson Context During Summer Swim Instruction

Benjamin Schwamberger and Zachary Wahl-Alexander

Abstract

Summer swim programs provide a unique opportunity to engage children in PA as well as an important life-saving skill. Offering summer swim programs is critical, especially for minority populations who tend to have higher rates of drowning, specifically in youth populations. The purpose of this study was to determine the lesson context and children's participation levels during a summer swimming program taught by two experienced PE teachers. The participants in this study were two experienced PE teachers and 45 children who were enrolled in the summer swim program. Data were collected using the System for Observing Fitness Instruction Time (SOFIT) and analyzed using MANOVA and ANOVA statistical tests. Results indicated that the students overall MVPA levels during the swim program were very high (58.96 %). Results also indicated that a majority of the lesson context was spent in skill practice (47.31%), and management (20.23%) was the lowest. These findings provide additional indications that swim instruction is a viable option to provide children with ample MVPA. It would be beneficial moving forward for schools to include swim instruction in the curriculum not only to improve water safety, but also to provide high levels of PA.

Benjamin Schwamberger is an assistant professor, Human Performance Department, Minnesota State University-Mankato. Zachary Wahl-Alexander is an assistant professor, Kinesiology and Physical Education Department, Northern Illinois University. Please send author correspondence to ben.schwamberger@mnsu.edu

Summer swim programs provide a unique opportunity to engage children in physical activity (PA) as well as a life-saving skill. An estimated 1 in 5 people who die from drowning are children 14 and younger, and the rate of fatally drowning among African Americans is significantly higher among children 5–14 years old and almost triple the rate of White children (Laosee, Gilchrist, & Rudd, 2012). Providing minorities with opportunities to take part in swim programs is crucial because it increases individuals' swimming ability, further lessening their chance of drowning, and incorporates a health-enhancing skill high in moderate to vigorous physical activity (MVPA). Other benefits from swimming include improvements in body composition, muscular and skeletal improvements, and an increase in overall flexibility, as well as enhanced overall circulatory function (Maglischo & Brennan, 1985; Lees, 2007). In addition, swimming directly benefits children psychologically through improving overall self-image and reducing stress levels.

Although swimming is considered to be an activity that provides students with higher amounts of MVPA, one difficulty is how to measure students' activity levels. This is due to the ineffectiveness of typical instruments such as pedometers or accelerometers in the water. There is a lack of research examining PA levels of children involved in swimming programs within the physical education (PE) setting (Schwamberger & Wahl-Alexander, 2016). Warburton and Woods (1996) assessed levels of MVPA in elementary students involved in swimming lessons and found that students were actively engaged in MVPA only 9% of instructional time. Additionally, Cardon, Verstraete, De Clercq, and Bourdeaudhuij (2004) compared students' MVPA levels during swimming and nonswimming elementary PE classes. Results indicated that students' MVPA was higher in the swimming class compared to the nonswimming class, further signifying the overall benefits swimming can provide to children. However, further research examining swimming levels in PE and in other contexts outside of PE is needed.

The System for Observing Fitness Instruction Time (SOFIT) is a direct observational instrument used to assess time spent at various PA levels and lesson context and is recognized as a valid research instrument for assessing student PA levels as well as the contexts of a lesson (McKenzie et al., 1995; McKenzie, Sallis, & Nader, 1991; Pope,

Coleman, Gonzalez, Barron, & Heath, 2002). To date, several researchers have assessed student activity level using SOFIT. Recently, Smith, Lounsbery, and McKenzie (2014) assessed high school PE classes to compare PA levels and lesson contexts of boys only, girls only, and coed PE classes. They found that the quality of PE that students received was dependent on the overall gender makeup of the class. Females were shown to be significantly less active than their male counterparts regardless of the gender makeup in the class (Smith et al., 2014).

Researchers have suggested that SOFIT is appropriate in determining activity levels for children during swim instruction (McKenzie et al., 1995; McKenzie et al., 1991; Pope et al., 2002), and Cardon et al. (2004) validated this assumption. These researchers validated SOFIT for use in water through randomized testing of children's registered heart rates while in the water, compared to the five SOFIT activity levels (i.e., lying down, sitting, standing, walking, and being active). Following their study, Cardon et al. noted that SOFIT is an appropriate instrument to "register physical activity levels during swimming classes" (p. 259).

Although researchers have previously deemed SOFIT appropriate to use in this context, few have examined MVPA of swim instruction. In the Cardon et al. (2004) study, the researchers coded student activity level according to body position and movement while in and out of the water. Results from the study indicated that PA levels within the PE swimming groups were higher than those within the PE nonswimming groups. Specifically, students in the swimming groups were involved in MVPA 52% of the lessons compared to only 40% for the nonswimming lessons.

Swim instruction has been shown to provide high levels of MVPA when delivered by experienced instructors in the PE setting. However, to date, there has been a lack of research focusing on the use of SOFIT to determine MVPA levels in contexts outside the traditional PE setting. With exceptionally high drowning rates among African American children, providing developmentally appropriate swim instruction to this population seems dually beneficial. Therefore, the purpose of this study was to determine the lesson context and children's participation levels during a summer swimming program taught by two experienced PE teachers.

Method

Participants and Setting

The participants in this study were 45 fourth and fifth grade children with an average age of 9.81 (28 boys, 17 girls). All children were selected to participate in this study because of their enrollment in a summer swimming program at a local YMCA in a low-income community.

Two experienced PE teachers who were enrolled in a master's program at a large public university in the Southeastern United States also participated in this study. Both teachers were female, Caucasian, and in their 20s. These teachers were selected because they were WSI-certified swim instructors with over 3 years of experience teaching this content. Written informed consent and assent were obtained from each child, the child's guardian, and both instructors. The university human subjects committee approved the study.

The swimming program consisted of 16 lessons led by the two participants who were experienced WSI swim instructors. All lessons transpired at a local swimming pool, which was within walking distance from the local YMCA. This pool was conducive to providing developmentally appropriate swim instruction because it was shallow along the edges and large enough for groups to be spaced out accordingly. The duration of each lesson was 50 min, with 10 min allocated for changing out of their swimming attire following instruction. During every lesson, the children were grouped according to ability level, and they received instruction from the same teacher throughout the program.

Systematic Observation Instrument

Lessons were videotaped and coded with SOFIT (McKenzie et al, 1991). SOFIT uses momentary time sampling (10-s observe, 10-s record), to quantify key elements of the lesson objectively, including student activity levels and teacher behaviors, and is often used in the PE setting (McKenzie et al., 1991). The observer made a decision every 20 s throughout the duration of the video while coding student behaviors and lesson context. To simplify this process, all videotapes were synchronized with a tape recorder used to cue the investigators

when to observe or record the data. For this study, student levels of activity were coded in accordance with Cardon et al. (2004). Table 1 provides an example of how each action during the lessons was coded.

Table 1
SOFIT Student Levels of Activity

SOFIT 1	SOFIT 2	SOFIT 3	SOFIT 4	SOFIT 5
Lie down with minimal movement.	Sitting on the side of the pool.	Stand in pool with minimal movement.	Walk around the pool moderately paced.	Swim with stroke of choice. Walk in waist- to chest-deep water. Swim with legs only.

For 10 s, the observer watched one student's behavior, and during the next 10 s recorded the observed data. In congruence with previous recommendations (McKenzie et al., 1991), one target individual was selected and coded at random. Every 4 min, another randomly selected student was observed, and this continued for the duration of each lesson. In line with SOFIT instructions (McKenzie et al., 1991), actual PE instruction time started when half of the class reached the instructional context and concluded when half of the class departed the instructional space.

Observer training. The initial observer training consisted of both authors watching and coding two 1-hr swimming videos simultaneously. After each 10-s interval, the video was stopped and a discussion ensued to clarify the proper description. This occurred at every interval for both hours of video. Following this, each author coded 15 additional hours of supplementary swimming lessons that were not part of this study as practice before interobserver reliability checks.

Interobserver reliability. Following the initial training, both authors watched and coded four 45-min swim lessons individual-

ly. This protocol was used in previous studies as a sufficient way to obtain interobserver reliability (Cardon et al., 2004). Reliability between both authors was calculated using interval comparisons of the test lessons. The percentages that resulted from this check were 94% (student behavior), 96% (lesson context), and 96% (teacher behavior), far exceeding the 80% recommendation by van der Mars (1989). Additional interobserver reliability checks were conducted throughout analysis to counteract observer shifting from taking place.

Data Analysis

Each percentage for student activity, lesson context, and teacher behavior for each lesson was entered into SPSS to determine the descriptive statistics for lessons taught by both teachers. The descriptive data from each instructor were then compared by employing distinct MANOVAs for student activity, lesson context, and teacher behavior. When necessary, ANOVA follow-ups were conducted. The level of significance for all inferential tests was $p < .05$.

Results

An overview of the percentages of lesson time spent in different engagement levels during swimming classes of the two swimming instructors is shown in Table 2. The average percentage of MVPA engagement during lesson time was high for Instructor 1 (58.5%) and Instructor 2 (59.3%), with a combined total (58.96%) just under 60%. Out of the five SOFIT categories, both instructors spent a majority of their time (Instructor 1 = 35.8%, Instructor 2 = 39.0%, Combined = 37.42%) in SOFIT 5 (swim with stroke of choice, walk in waist- to chest-deep water, swim with legs only), and the least observed category was SOFIT 1 for both instructors (lying down with minimal movement).

Table 2
Means, Standard Deviations, and Ranges for Percentage of Lesson Time Engaged in the Five SOFIT Activity Categories in Swimming Classes

Activity category	Instructor 1 *M* ± *SD* (range)	Instructor 2 *M* ± *SD* (range)	Instructors 1 & 2 *M* ± *SD* (range)
SOFIT 1	0.62 ± 1.1 (0–3)	0.31 ± 1.1 (0–4)	0.46 ± 1.1 (0–4)
SOFIT 2	15.2 ± 6.8 (5–25)	12.31 ± 3.7 (5–19)	13.77 ± 5.6 (5–25)
SOFIT 3	22.3 ± 5.0 (14–31)	26.7 ± 7.2 (16–43)	24.54 ± 6.5 (14–43)
SOFIT 4	22.7 ± 4.1 (14–30)	20.3 ± 3.6 (14–26)	21.54 ± 3.9 (14–30)
SOFIT 5	35.8 ± 5.6 (29–45)	39.0 ± 5.3 (26–46)	37.42 ± 5.6 (26–46)
MVPA	58.5 ± 5.6 (51–69)	59.3 ± 5.8 (49–65)	58.96 ± 5.6 (49–69)

An overview of the percentages of time spent in different lesson contexts during swimming classes of the two swimming instructors is shown in Table 3. The highest category within the lesson contexts for Instructor 1 (51.7%) and Instructor 2 (42.8%) was skill practice, with a combined total (47.31%) just under 50%. Instructor 1 (12.0%) and Instructor 2 (28.4%) spent the least amount of time in management. For the knowledge category, Instructor 1 (32.8%) and Instructor 2 (27.4%) were similar, with a combined total (30.15%) just over 30%.

Table 3
Means, Standard Deviations, and Ranges for Percentage of Lesson Time Engaged in the Five SOFIT (Lesson Context)

Activity category	Instructor 1 *M* ± *SD* (range)	Instructor 2 *M* ± *SD* (range)	Instructors 1 & 2 *M* ± *SD* (range)
Management	12.0 ± 6.4 (6–29)	28.4 ± 3.1 (23–34)	20.23 ± 9.6 (6–34)
Knowledge	32.8 ± 9.1 (16–48)	27.4 ± 1.6 (16–34)	30.15 ± 7.9 (16–48)
Skill Practice	51.7 ± 5.9 (36–60)	42.8 ± 8.2 (27–57)	47.31 ± 8.3 (27–60)
Promotes In-Class PA	96.7 ± 6.2 (82–103)	98.7 ± 11.8 (79–117)	97.69 ± 9.3 (79–117)

Discussion

The Centers for Disease Control and Prevention (2015) recommends that adolescents participate in a minimum of 60 min of PA each day. Previous research suggests that traditional PE programs fall short of helping children reach this recommendation (Scruggs, 2007). Numerous studies have demonstrated that PE classes do not provide children with enough activity to meet the health-related recommendation of 60 or more minutes of MVPA (Cardon et al., 2004; Friedman, Belsky, & Booth, 2003). With this in mind, many researchers have called to pinpoint different venues allowing for additional opportunities for children to become more physically active (Schwamberger & Sinelnikov, 2015). Many researchers have examined activity levels during recess (Mckenzie, Sallis, & Elkder, 1997; Stratton, 2000; Sleap & Warburton, 1996), but there is a lack of research evaluations of summer programs with a PE component. Therefore, there is a need to examine the level of PA in children participating in a summer swimming program.

In line with the literature (Cardon et al., 2004), this study indicated that swimming was a successful avenue for children to perform at the moderate to vigorous activity range. Both studies had similar results, with more than half of class time (58.9%) spent in the targeted MVPA range. These results further refute prior studies whose results showed extremely low MVPA during elementary swimming classes

(Warburton & Woods, 1996). These findings provide additional indications that swim instruction is viable in providing children with ample MVPA. Moving forward, it would be beneficial for schools to include introductory swim instruction in the curriculum not only for improved water safety, but also because of the high level of activity swim instruction provides.

Another important finding of this study was the low percentage of time spent in management by both instructors (12.0%, 28.4%). These results are significantly lower than those in previous studies of management time in traditional PA settings (Logan, Robinson, Webster, & Rudisill, 2015; Smith et al., 2014).

There are many potential reasons for this significantly low level of management time. One explanation may be the teacher's comfort level of the swimming content. Research suggests that experienced teachers with high levels of content knowledge of the subject they are teaching are more likely to spend less time in managerial tasks (Chen & Curtner-Smith, 2013; Ward, 2013). Both teachers in this study had extensive teaching experience with this content, likely leading to higher levels of competency. This experience may have resulted in lower levels of management time throughout the program. Examining further the link between teaching experience and decreases in management time (Melnick & Meister, 2008) in future summer programs would be beneficial.

Although SOFIT has seldom been used to examine PA levels in summer programs, the results from this study suggest that SOFIT is effective in assessing children's PA levels. There is a plethora of PA research within a traditional context (Friedman et al., 2003; Logan et al., 2015; McKenzie et al., 1995; Warburton & Woods, 1996), but few researchers have examined before-school (Beighle & Moore, 2012; Wiseman & Coe, 2014), after-school (Schwamberger & Sinelnikov, 2015), or summer athletic (Hickerson & Henderson, 2014; Wahl-Alexander & Sinelnikov, 2014) programs. The lack of research in this setting may be due to the lack of collaborations between universities and their local community or to the absence of funding generated to initiate such programs. It is clear that programs similar to this do rampantly exist; however, there has been a lack of research in which their effectiveness is addressed. Future studies implementing SOFIT are needed to address if current programs are providing students with high rates of MVPA.

The findings in this study advance the research of Cardon et al. (2004), showing that swim instruction can be an effective way to provide students with high levels of MVPA. With such a blatant necessity to increase student activity levels, this study provides evidence that supplemental summer instruction can be successful at aiding in this endeavor. Furthermore, finding instructors with extensive teaching experience will likely lead to high levels of MVPA and less management time. Although SOFIT has been effective at determining PA levels in a wide context of settings, potential studies furthering research in contexts outside of the traditional PE setting is valuable. It would be noteworthy to understand if other activities in the summer setting are as effective at providing children with high bouts of MVPA.

References

Beighle, A., & Moore, M. (2012). Physical activity before and after school. *Journal of Physical Education, Recreation, and Dance, 83*(6), 25–28. https://doi.org/10.1080/07303084.2012.10598792

Cardon, G., Verstraete, S., De Clerq, D., & Bourdeaudhuij, I. D. (2004). Physical activity levels in elementary-school physical education: A comparison of swimming and nonswimming classes. *Journal of Teaching in Physical Education, 23,* 252–263. https://doi.org/10.1123/jtpe.23.3.252

Centers for Disease Control and Prevention. (2015). How much physical activity do children need? Retrieved from http://www.cdc.gov/physicalactivity/basics/children/

Chen, Y., & Curtner-Smith, M. (2013). Hegemonic masculinity in sport education: Case studies of experienced in-service teachers with teaching orientations. *European Physical Education Review, 19,* 360–380. https://doi.org/10.1177/1356336X13495631

Friedman, S. L., Belsky, J., & Booth, C. (2003). Frequency and intensity of activity of third-grade children in physical education. *Archives of Pediatric & Adolescent Medicine, 157,* 185–190. https://doi.org/10.1001/archpedi.157.2.185

Hickerson, B. D., & Henderson, K. A. (2014). Opportunities for promoting youth physical activity: An examination of youth summer camps. *Journal of Physical Activity and Health, 11,* 199–205. https://doi.org/10.1123/jpah.2011-0263

Laosee, O. C., Gilchrist, J., & Rudd, R. (2012). Drowning 2005–2009. *Morbidity and Mortality Weekly Report, 61*(19), 344–347.

Lees, T. (2007). *Water fun.* Champaign, IL: Human Kinetics.

Logan, S. W., Robinson, L. E., Webster, E. K., & Rudisill, M. E. (2015). The influence of instructional climates on time spent in management tasks and physical activity for 2nd grade students during physical activity. *European Physical Education Review, 21,* 195–205. https://doi.org/10.1177/1356336X14555304

Maglischo, E. W., & Brennan, C. F. (1985). *Swim for the health of it.* Palo Alto, CA: Mayfield.

McKenzie, T. L., Feldman, H., Woods, S. E., Romero, K. A., Dahlstrom, V., & Stone, E. J. (1995). Children's activity levels and lesson context during third-grade physical education. *Research Quarterly for Exercise and Sport, 66,* 184–193. https://doi.org/10.1080/02701367.1995.10608832

Mckenzie, T. L., Sallis, J. F., & Elkder, J. P. (1997). Physical activity levels and prompts in young children at recess: A two-year study of a bi-ethnic sample. *Research Quarterly for Exercise and Sport, 68,* 195–202. https://doi.org/10.1080/02701367.1997.10607998

McKenzie, T. L., Sallis, J. F., & Nader, P. R. (1991). System for Observing Fitness Instruction Time. *Journal of Teaching in Physical Education, 11,* 195–205. https://doi.org/10.1123/jtpe.11.2.195

Melnick, S. A., & Meister, D. G. (2008). A comparison of beginning and experienced teachers' concerns. *Educational Research Quarterly, 31*(3), 40–56.

Pope, R. P., Coleman, K. J., Gonzalez, E. C., Barron, F., & Heath, E. M. (2002). Validity of a revised System for Observing Fitness Instruction Time (SOFIT). *Pediatric Exercise Science, 14,* 135–146. https://doi.org/10.1123/pes.14.2.135

Schwamberger, B., & Sinelnikov, O. (2015). Connecting physical education to out-of-school physical activity through sport education. *Journal of Physical Education, Recreation, and Dance, 86*(9), 39–44. https://doi.org/10.1080/07303084.2015.1085344

Schwamberger, B., & Wahl-Alexander, Z. (2016). *Swim to the top: A university based partnership focused on enhancing swimming competency.* Manuscript submitted for publication.

Scruggs, P. W. (2007). Quantifying activity time via pedometers in fifth- and sixth-grade physical education. *Journal of Physical Activity and Health, 4,* 215–227. https://doi.org/10.1123/jpah.4.2.215

Sleap, M., & Warburton, P. (1996). Physical activity levels of 5–11-year-old children in England: Cumulative evidence from three direct observation studies. *International Journal of Sports and Medicine, 96,* 248–253. https://doi.org/10.1055/s-2007-972841

Smith, N. J., Lounsbery, A. F., & McKenzie, T. L. (2014). Physical activity in high school physical education: Impact of lesson context and class gender composition. *Journal of Physical Activity and Health, 11,* 127–135. https://doi.org/10.1123/jpah.2011-0334

Stratton, G. (2000). Promoting children's physical activity in primary school: An intervention study using playground markings. *Ergonomics, 43,* 1538–1546. https://doi.org/10.1080/001401300750003961

van der Mars, H. (1989). Observer reliability: Issues and procedures. In P. W. Darst, D. B. Zakrajsek, & V. H. Mancini (Eds.), *Analyzing physical education and sport instruction* (2nd ed., pp. 53–80). Champaign, IL: Human Kinetics.

Wahl-Alexander, Z., & Sinelnikov, O. (2014, November/December). Sport education: An innovative practice for activities at camp. *Camping Magazine, 87*(6), 44–47.

Warburton, P., & Woods, J. (1996). Observation of children's physical activity levels during primary school physical education lessons. *European Journal of Physical Education, 1,* 56–65. https://doi.org/10.1080/1740898960010106

Ward, P. (2013). The role of content knowledge in conceptions of teaching effectiveness in physical education. *Research Quarterly for Exercise and Sport, 84,* 431–440. https://doi.org/10.1080/02701367.2013.844045

Wiseman, B. D., & Coe, D. P. (2014). Physical activity during a before school activity program. *Medicine and Science in Sports and Exercise, 46*(5 Suppl.), 884–887. https://doi.org/ 10.1249/01.mss.0000451288.22239.24

The Physical Educator Vol. 73 • pp. 745–756 • 2016
https://doi.org/10.18666/TPE-2016-V73-I4-6570

PHYSICAL ACTIVITY

Effect of Body Composition, Physical Activity, and Aerobic Fitness on the Physical Activity and Fitness Knowledge of At-Risk Inner-City Children

Timothy A. Brusseau, Ryan D. Burns, James C. Hannon

Abstract

SHAPE America has highlighted the importance of developing physically literate children as part of quality physical education programming. Unfortunately, most children know little about physical activity and health-related fitness. The purpose of this study was to examine the physical activity and fitness content knowledge of at-risk inner-city children and determine if students who accumulate more physical activity, do more PACER laps, and/or have a lower BMI have higher levels of knowledge. Participants included 569 inner-city children (300 girls, 269 boys) from the Southwest USA who completed the PE Metrics knowledge test, wore a pedometer for 1 school week, completed the PACER test, and had their height and weight measured. Two-way and three-way factorial ANOVA tests were used to examine potential differences between genders, between grades, and among tertiles of physical activity and health-related fitness performance on the PE Metrics knowledge test. On average, students scored 38% on the PE Metrics knowledge test. Boys and girls scored similarly, sixth

Timothy A. Brusseau is assistant professor, Department of Health, Kinesiology, and Recreation, University of Utah. Ryan D. Burns is postdoctoral research associate, Department of Health, Kinesiology, and Recreation, University of Utah. James C. Hannon is professor, Department of Coaching and Teaching Studies, West Virginia University. Please send author correspondence to tim.brusseau@utah.edu

graders scored lower than fourth and fifth graders, and children who were in the low and high BMI tertiles scored higher than children in the medium tertile ($p < 0.05$). As school day step counts and PACER laps increased, knowledge scores trended higher. At-risk youth need additional opportunities to learn content knowledge related to physical activity and fitness. Increased physical activity and aerobic fitness were related to small increases in knowledge scores. Future interventions should focus on child behavior and knowledge.

One of the objectives of physical education programs is to develop physically literate children who possess the knowledge and skills to participate in activity for a lifetime (Society of Health and Physical Educators, 2013). Knowledge about physical activity (PA) and physical fitness has been highlighted as important for individuals to be active for a lifetime (Zhu, Safarit, & Cohen, 1999). Studies have suggested that children do not have the requisite knowledge needed to adopt healthy behaviors (Desmond, Price, Smith, Smith, & Stewart, 1990; Hopple & Graham, 1995; Keating, Chen, Guan, Harrison, & Dauenhauer, 2009; Liang et al., 1993; Prewitt et al., 2015). More specifically, Kulinna (2004) examined this in an elementary school with the use of health-related knowledge portfolio tasks. The author discovered that the students lacked strong content knowledge; for example, more than 50% of the third to sixth grade students were unable to list four aerobic activities. Brusseau, Kulinna, and Cothran (2011) further examined students' knowledge using similar portfolio tasks with two American Indian communities. Students completed health-related fitness and PA behavior portfolio tasks, and the results indicated that students across all grade levels held many misconceptions and misunderstandings of these concepts. Furthermore, researchers found that only 7% of third grade students were able to describe why PA is important. More recently, Hodges, Hodges Kulinna, and Lee (2014) found that the average score for over 700 suburban fifth graders was under 50% on the PE Metrics (National Association for Sport and Physical Education [NASPE], 2010) PA and fitness test. The evidence on students' lack of knowledge is disappointing given that these findings have been evident for 2 decades (Hopple & Graham, 1995).

Spiegel and Foulk (2006) suggested that knowledge of PA behaviors can be the foundation that encourages people to engage in

more PA throughout their lifetimes. This was found to contain some validity, as other researchers have found that individuals engaging in more activity during leisure time had greater knowledge (Dale, Corbin, & Cuddihy, 1998; DiLorenzo, Stucky-Ropp, Vander Wal, & Gotham, 1998). DiLorenzo et al. (1998) discovered that exercise knowledge is one of a few key determinants to students' PA participation. Furthermore, conceptual-based physical education (CPE), a model that teaches health knowledge in the classroom partnered with PA opportunities, has also been found to influence PA patterns positively during leisure time (Dale et al., 1998). More specifically, they reported that after a yearlong CPE program, secondary students significantly increased their PA levels when compared to students with both traditional PE and control students. Therefore, to date the literature has begun to suggest that if students gain additional knowledge, they often engage in more PA. Despite this, little effort has been made to explore the relationship, if any, between knowledge and body composition or aerobic fitness. Therefore, the purpose of this manuscript was to determine if PA patterns (steps counts), aerobic fitness (PACER), or BMI had an effect on the fitness and PA content knowledge of ethnically diverse elementary school children from low-income and inner-city families. It was hypothesized that children who accumulated more steps, had higher PACER scores, and lower BMI would score better on the PE Metrics fitness and PA knowledge test. A secondary purpose was to explore differences on PE Metrics performance by grade and gender.

Method

Participants

Participants were 569 (300 girls, 269 boys) fourth to sixth grade students from three inner-city Title 1 schools. Ninety-four percent of participating youth came from low-income (83% free and 11% reduced lunch) families, and the sample was 86% ethnic minority —63% Hispanic, 14% Caucasian, 7% Pacific Islander, 6% Black, 5% Asian, 3% American Indian, and 2% multiracial.

Instruments

Physical activity and physical fitness knowledge test. SHAPE America endorses the PE Metrics (NASPE, 2010) test, which was

used to examine PA and physical fitness knowledge in this study. The instrument has been suggested as a valid and reliable assessment tool (Dyson & Williams, 2012; Zhu et al., 2011) and has been used in research (Hodges et al., 2014) with this age group. More specifically, the research team used the Standards 3 and 4 fifth grade test that contained 28 multiple-choice questions, of which 15 were randomly selected to fit the time frame for testing the children at the beginning of a physical education class.

Pedometers. PA was measured using Yamax DigiWalker CW600 pedometers (Tokyo, Japan). The devices were worn for 5 school days (Monday through Friday) between the hours of 8 a.m. and 3 p.m. Instruments were worn on the hip at the level of the iliac crest above the knees on the right hip. Classroom teachers, physical educators, and members of the research team ensured that the devices were worn the entire school day.

The pedometers included a 7-day memory that was used to record steps each day of the school week. Yamax DigiWalker models have been shown to provide an accurate recording of steps within ± 3% of actual steps (Schneider, Crouter, Lukajic, & Bassett, 2003), and have been shown to be a valid measure of free-living PA (Crouter, Schneider, Karbulut, & Bassett, 2003).

Health-related fitness. BMI was calculated using standard procedures taking a student's weight in kilograms divided by the square or his or her height in meters. Height was measured to the nearest 0.01 m using a portable stadiometer (Seca 213; Hanover, MD, USA), and weight was measured to the nearest 0.1 kg using a portable medical scale (BD-590; Tokyo, Japan). Height and weight were collected in the hallway during each student's physical education class.

Aerobic fitness was measured using the 20-m Progressive Aerobic Cardiovascular Endurance Run (PACER), administered during each student's physical education class. The PACER was conducted on a marked gymnasium floor with background music provided by a compact disc. Each student was instructed to run from one floor marker to another floor marker across a 20-m distance within an allotted time frame. The allotted time given to reach the specified distance incrementally shortened as the test progressed. If the student twice failed to reach the other floor marker, the test was terminated (Meredith & Welk, 2010). The final score was recorded in laps.

Procedures

During three consecutive weeks during the winter of 2015, research team members worked with physical education teachers to collect PACER scores and height and weight during class. Half the class completed the PACER with one research team member, and the other half played a game with the physical education teacher, with students being called out to have their height and weight measured. Approximately halfway through class, the groups switched stations (no order effect was found between students who tested first and students who tested second). During a separate class, members of the research team administered the knowledge assessment test following a specific protocol during which each question and answer was read to the students, with an approximately 20–30-s wait time for each question.

Analyses

BMI, PACER, and pedometer steps were stratified into tertiles of approximately equal number. The preliminary descriptive analysis included running a 2×3 factorial ANOVA test to examine the differences between genders and among grade levels on PA, health-related fitness, and the PE Metrics knowledge test scores. The alpha level was adjusted using the Bonferroni method to account for analysis on multiple dependent variables. The primary analysis consisted of a $3 \times 3 \times 3$ factorial ANOVA test to examine differences among tertiles of BMI, PACER, and pedometer steps on the PE Metrics knowledge scores. A Tukey post hoc test was employed for any statistically significant main effects from the three-way ANOVA. All analyses had an initial alpha level of $p \leq 0.05$ and were carried out using STATA (14.0) statistical software package (College Station, TX, USA).

Results

On average, students scored 38% on the PE Metrics knowledge test. Table 1 highlights the means and standard deviations on the PE Metrics knowledge test (raw score out of 15) by gender, grade level, and tertile groupings for PA and health-related fitness. A statistically significant main effect was found for grade level on knowledge test scores, $F(2, 180) = 3.89$, $p = 0.02$. Tukey post hoc tests revealed that children in Grades 4 and 5 scored higher on the knowledge test

compared to children in Grade 6. A statistically significant main effect was also found for BMI on PA knowledge, $F(2, 180) = 3.64$, $p = 0.03$. Post hoc tests revealed that children in the high BMI tertile and children in the low BMI tertile scored higher on the PA knowledge test compared to children in the medium BMI tertile. No other main effects were found, but there were trends that children with higher PACER scores and who accumulated higher step counts scored higher on the PE Metrics knowledge test.

Table 1
Knowledge Scores by Gender, Grade, Physical Activity, Aerobic Fitness, and BMI

Category	Knowledge score	*SD*	95% CI
Gender			
Male	5.69	3.34	5.29, 6.09
Female	5.83	2.84	5.51, 6.15
Combined	5.77	3.06	5.52, 6.02
Grade			
4	6.02	2.99	5.59, 6.45
5	6.07	2.99	5.64, 6.50
6*	4.34	3.10	3.90, 4.78
School Step Counts			
High	5.75	2.68	5.37, 6.12
Medium	5.57	2.98	5.15, 5.99
Low	5.22	2.73	4.83, 5.60
PACER Laps			
High	5.82	3.11	5.38, 6.46
Medium	5.75	3.36	5.27, 6.22
Low	5.41	2.7	5.03, 5.79
BMI			
High	6.31	3.07	5.87, 6.75
Medium*	4.93	2.93	4.72, 5.14
Low	6.13	3.09	5.91, 6.35

*Significantly different when compared to other groups.

Discussion

Similar to children in previous research (Brusseau, Kulinna, & Cothran, 2011; Kulinna, 2004), the children in this study lacked overall content knowledge. In fact, the average score was 38.5%. These scores are lower than those in the previous study in which PE Metrics was used (Hodges et al., 2014) and indicate lower knowledge when compared across other studies (Hopple & Graham, 1995; Kulinna, 2004). These scores are concerning, especially considering the lack of PA in low-income inner-city youth (Trost et al., 2013).

Although we know that PA decreases with age and grade, we anticipated that as students advanced in grade, they would have performed better on the knowledge test simply by accumulating more knowledge over time. We found that fourth and fifth graders performed similarly on the test and sixth graders scored significantly lower compared to the earlier grades, which we believe might be related to the sixth graders feeling they were "too cool" to take the test and not taking it as seriously as the younger students did. There were no significant differences by gender, which is similar to results in previous research (Brusseau, Kulinna, & Cothran, 2011). This is important because the literature (Harmon, Brusseau, Collier, & Lenz, 2013) makes it clear that inner-city ethnic minority boys at this age are more active than girls. Furthermore, boys outperformed girls on the PACER, which correlates to previous studies of aerobic fitness in at-risk youth (Brusseau, Finkelstein, Kulinna, & Pangrazi, 2014). It appears as if knowledge does not help to alleviate the natural gender difference in PA or aerobic fitness, as boys were more active and fit in the current sample (5,194 steps and 40.3 PACER laps for boys; 4,498 steps and 34.4 PACER laps for girls; $\Delta = 696$ steps, $\Delta = 5.9$ laps). Our findings suggest that knowledge is not dependent on either grade or gender. It is important to note that these three schools did not offer any type of health education and that this content (health-related fitness and PA) was not directly covered in academic subjects, although science classes did cover material related to the health of the human body. Furthermore, physical education was a traditional model that only met 1 day/week. Because of the time constraints, the physical education paraprofessionals focused exclusively on trying to get children active during class. Another potential issue is that classes were taught by paraprofessionals. Research has started to in-

dicate that classes taught by nonspecialists result in less PA (Hannon, Destani, McGladrey, Williams, & Hill, 2013) and in more time managing children (Hall, Larson, Heinemann, & Brusseau, 2015). It appears to be important for schools (especially inner-city schools) to find a way to incorporate content knowledge related to PA and fitness.

Of importance to our findings were the small (but not significant) trends that the more active the child, the better he or she performed on the knowledge test. We anticipated these findings; however, we would have expected a much larger change score. Out of 15 questions, the difference between the low active group and the high active group was only a half question. These findings contradict the previous explorations, suggesting increased knowledge is related to significantly increased PA (i.e., DiLorenzo et al., 1998).

Similar to the step count trends with knowledge, knowledge slightly increased with increases in PACER laps. This change again was small, < .5 question. To our knowledge, this is the first study to look at differences in fitness content knowledge in comparison to actual aerobic fitness. Aerobic fitness is an important component for the health (Janssen & LeBlanc, 2010) and the cognition (Chaddock-Heyman, Hillman, Cohen, & Kramer, 2014) of children, and we suggest that improved knowledge of this concept can only help with changing the needed behavior.

Body composition did not relate to increases in knowledge, which differs from the role that body composition has in the literature in which both PA (Brusseau, Kulinna, Tudor-Locke, et al., 2011) and physical fitness (Stratton et al., 2007) improve when children's BMI decreases. This might be associated with the overall increases in BMI (Ogden, Carroll, Kit, & Flegal, 2012) in youth and the concept that youth can be fat and fit (Hainer, Toplak, & Stich, 2009).

Future research needs to replicate our work with children from different ethnic and socioeconomic backgrounds to help make the findings more generalizable. Similarly, it is clear that content knowledge needs to be targeted in research and practical programming in schools to address the concerning findings of our work.

Conclusion

In conclusion, at-risk inner-city children in this sample lacked PA and fitness knowledge. Although the lack of knowledge is not new, the low scores compared to those in previous research is especially alarming considering that these children often lack the access and opportunity to become physically active, which have been consistently shown as barriers to activity (Sallis, Prochaska, & Taylor, 2000). Increased opportunities for PA and improved knowledge should be considered when planning future interventions.

References

Brusseau, T. A., Finkelstein, T., Kulinna, P. H., & Pangrazi, C. (2014). Health-related fitness of American Indian youth. *Research Quarterly for Exercise and Sport, 85,* 257–261. https://doi.org/10.1080/02701367.2014.893050

Brusseau, T. A., Kulinna, P. H., & Cothran, D. J. (2011). Physical activity content knowledge of Native American children. *The Physical Educator, 68,* 66–77.

Brusseau, T. A., Kulinna, P. H., Tudor-Locke, C., Ferry, M., van der Mars, H., & Darst, P. W. (2011). Pedometer-determined segmented physical activity patterns of fourth- and fifth-grade children. *Journal of Physical Activity and Health, 8*(2), 279. https://doi.org/10.1123/jpah.8.2.279

Chaddock-Heyman, L., Hillman, C. H., Cohen, N. J., & Kramer, A. F. (2014). III. The importance of physical activity and aerobic fitness for cognitive control and memory in children. *Monographs of the Society for Research in Child Development, 79*(4), 25–50. https://doi.org/10.1111/mono.12129

Crouter, S. E., Schneider, P. L., Karabulut, M., & Bassett, D. R. (2003). Measuring steps, distance, and energy cost. *Medicine & Science in Sports & Exercise, 35,* 1455–1460. https://doi.org/10.1249/01.MSS.0000078932.61440.A2

Dale, D., Corbin, C. B., & Cuddihy, T. F. (1998) Can conceptual physical education promote physically active lifestyles? *Pediatric Exercise Science, 10,* 97–109. https://doi.org/10.1123/pes.10.2.97

Desmond, S. M., Price, J. H., Smith, R. S., Smith, D., & Stewart, P. W. (1990). Urban Black and White adolescents' physical fitness status and perceptions of exercise. *Journal of School Health, 60,* 313–314. https://doi.org/10.1111/j.1746-1561.1990.tb05919.x

Dilorenzo, T. M., Stucky-Ropp, R. C., Vander Wal, J. S., & Gotham, H. J. (1998). Determinants of exercise among children: A longitudinal analysis. *Preventive Medicine, 27,* 470–477. https://doi.org/10.1006/pmed.1998.0307

Dyson, B. P., & Williams, L. H. (2012). The role of PE Metrics in physical education teacher education. *Journal of Physical Education, Recreation, & Dance, 83*(5), 29–32. https://doi.org/10.1080/07303084.2012.10598777

Hainer, V., Toplak, H., & Stich, V. (2009). Fat or fit: What is more important? *Diabetes Care, 32*(Suppl. 2), S392–S397. https://doi.org/10.2337/dc09-S346

Hall, A., Larson, J. N., Heinemann, A., & Brusseau, T. A. (2015). Frequency and type of reinstruction strategies used by paraprofessionals and licensed teachers in elementary physical education settings. *The Physical Educator, 72,* 433–444.

Hannon, J. C., Destani, F., McGladrey, B., Williams, S., & Hill, G. (2013). Physical activity levels, lesson contexts, and teacher behaviors in elementary physical education classes taught by paraeducators. *International Journal of Elementary Education, 2,* 23–26. https://doi.org/10.11648/j.ijeedu.20130203.11

Harmon, J., Brusseau, T. A., Collier, D., & Lenz, E. (2013). Habitual physical activity patterns of inner-city children. *Human Movement, 14,* 305–309. https://doi.org/10.2478/humo-2013-0036

Hodges, M., Hodges Kulinna, P., & Lee, C. (2014). Teaching healthy behaviour knowledge in primary school physical education. *Biomedical Human Kinetics, 6*(1), 33–39. https://doi.org/10.2478/bhk-2014-0006

Hopple C., & Graham, G. (1995). What children think, feel, and know about physical fitness testing. *Journal of Teaching in Physical Education, 14,* 408–417. https://doi.org/10.1123/jtpe.14.4.408

Janssen, I., & LeBlanc, A. G. (2010). Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity, 7*. https://doi.org/10.1186/1479-5868-7-40

Keating, X. D., Chen, L., Guan, J., Harrison, L., & Dauenhauer, B. (2009). Urban minority 9th grade pupils' health-related fitness knowledge. *Research Quarterly for Exercise and Sport, 80,* 747–755. https://doi.org/10.1080/02701367.2009.10599616

Kulinna, P. H. (2004). Physical activity and fitness knowledge: How much 1–6 grade pupils know? *International Journal of Physical Education, 41,* 111–121.

Liang, M. T., Dombrowski, H. T., Allen, T. W., Chang, C. O., Andriulli, J., Bastianelli, M., & Norris, S. D. (1993). Do medical pupils' knowledge and attitudes about health and exercise affect their physical fitness? *Journal of American Osteopathic Association, 93,* 1020–1024.

Meredith, M. D., & Welk, G. J. (2010). *Fitnessgram/Actvitygram test administration manual* (4th ed.). Champaign, IL: Human Kinetics.

National Association for Sport and Physical Education. (2010). *PE Metrics: Assessing national standards 1–6 in elementary school.* Reston, VA: Author.

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2012). Prevalence of obesity and trends in body mass index among US children and adolescents, 1999–2010. *JAMA, 307,* 483–490. https://doi.org/10.1001/jama.2012.40

Prewitt, S. L., Hannon, J. C., Colquitt, G., Brusseau, T. A., Newton, M., & Shaw, J. (2015). Effect of personalized system of instruction on health-related fitness knowledge and class time physical activity. *The Physical Educator, 72,* 23–39. https://doi.org/10.18666/tpe-2015-v72-i5-6997

Sallis, J. F., Prochaska, J. J., & Taylor, W. C. (2000). A review of correlates of physical activity of children and adolescents. *Medicine & Science in Sports & Exercise, 32,* 963–975. https://doi.org/10.1097/00005768-200005000-00014

Schneider, P. L., Crouter, S. E., Lukajic, O., & Bassett, D. R. (2003). Accuracy and reliability of 10 pedometers for measuring steps over a 400-m walk. *Medicine & Science in Sports & Exercise, 35,* 1779–1784. https://doi.org/10.1249/01.MSS.0000089342.96098.C4

Society of Health and Physical Educators. (2013). *National standards for K–12 physical education.* Reston, VA: Author.

Spiegel, S. A., & Foulk, D. (2006) Reducing overweight through a multidisciplinary school-based intervention. *Obesity, 14,* 88–96. https://doi.org/10.1038/oby.2006.11

Stratton, G., Canoy, D., Boddy, L. M., Taylor, S. R., Hackett, A. F., & Buchan, I. E. (2007). Cardiorespiratory fitness and body mass index of 9–11-year-old English children: A serial cross-sectional study from 1998 to 2004. *International Journal of Obesity, 31,* 1172–1178. https://doi.org/10.1038/sj.ijo.0803562

Trost, S. G., McCoy, T. A., Vander Veur, S. S., Mallya, G., Duffy, M. L., & Foster, G. D. (2013). Physical activity patterns of inner-city elementary schoolchildren. *Medicine & Science in Sports & Exercise, 45,* 470–474. https://doi.org/10.1249/MSS.0b013e318275e40b

Zhu, W., Rink, J., Placek, J. H., Graber, K. C., Fox, C., Fisette, J. L., . . . Raynes, D. (2011). PE Metrics: Background, testing theory, and methods. *Measurement in Physical Education and Exercise Science, 15*(2), 87–99. https://doi.org/10.1080/1091367X.2011.568363

Zhu, W., Safarit, M., & Cohen, A. (1999). *The national health-related physical fitness knowledge test: FitSmart test user manual* (High school ed.). Champaign, IL: Human Kinetics.

The Physical Educator Vol. 73 • pp. 757–776 • 2016
https://doi.org/10.18666/TPE-2016-V73-I4-7115

PHYSICAL ACTIVITY

Effects of "Fair Play Game" Strategy on Moderate to Vigorous Physical Activity in Physical Education

Liane B. Azevedo, Carla Vidoni, Sarah Dinsdale

Abstract

Less than 50% of a PE lesson is usually spent in MVPA. A dependent-group contingency strategy, "Fair Play Game," has shown effectiveness in increasing MVPA during PE lessons among students from affluent schools. The purpose of this study was to determine the effectiveness of this strategy on MVPA among students from an underserved community. The Fair Play Game strategy consisted of goal setting, prompts, feedback, and rewards. A single-subject multiple baseline design was applied across two classes of students, throughout 15 soccer lessons. Three students from each class (N = 6) were selected for an individual analysis according to their MVPA level at baseline (low, medium, and high). Students wore a waist-mounted accelerometer during lessons. Students with a low level of MVPA at baseline from Year 8 presented a positive change in trend, level, and percentage of nonoverlapping MVPA data. The intervention was not effective to change MVPA for the other students. The Fair Play Game might be effective in increasing PA levels in students with low levels of activity from undeserved areas. However, the intervention needs to be tailored for each population and applied regularly for the benefits to be expanded to the whole class.

Liane B. Azevedo is a senior lecturer, School of Health and Social Care, Teesside University. Carla Vidoni is an associate professor and program director for the Physical Education and Health Program, Department of Health & Sport Sciences, University of Louisville. Sarah Dinsdale is a research associate, School of Health and Social Care, Teesside University. Please send author correspondence to l.azevedo@tees.ac.uk

Only one third of children meet the current recommendation of 60 min of moderate to vigorous physical activity (MVPA) per day in England (Health Survey for England, 2008). Likewise, children from lower socioeconomic status groups tend to engage in lower levels of physical activity (PA; Carlson, Mignano, Norman, McKenzie, & Kerr, 2014) and higher levels of sedentary behavior (Brodersen, Steptoe, Boniface, & Wardle, 2007). Schools are seen as the main setting to encourage PA in children (De Bourdeaudhuij et al., 2011; van Sluijs, McMinn, & Griffin, 2008), and physical education (PE) is considered an ideal opportunity for promotion of regular PA (Sallis & McKenzie, 1991).

In 2000, Healthy People 2010 (U.S. Department of Health and Human Services, 2000) recommended that at least 50% of PE lesson time be spent on MVPA, which has been supported further by the Centers for Disease Control and Prevention (U.S. Department of Health and Human Services, 2010). However, it was found in one review study that middle and high school students spend only 40% of the PE lesson in MVPA (Fairclough & Stratton, 2005).

More recently in an analytical review, Sallis et al. (2012) described new goals for achieving Health Optimizing Physical Education (HOPE), defined as physical education that encompasses curriculum and lessons focused on health-related physical activity and fitness. The authors stated the importance of emphasizing high levels of MVPA during PE lessons. Furthermore, they suggested goals for the next 20 years, including the need for studies on PE to incorporate objective measures to assess MVPA levels and focus on developing low-cost and feasible methods for teachers to assess this accurately in classes (Sallis et al., 2012).

Some researchers have implemented interventions designed to increase MVPA levels during PE lessons. Results from systematic reviews reveal that interventions tend to promote a net increase of 10% in the amount of time spent in MVPA during lesson time (Kahn et al., 2002; Lonsdale et al., 2013). Several strategies have been used successfully to increase MVPA levels during PE lessons including professional learning focused on teacher pedagogy, management and instruction, and adding high-intensity activity to the usual PE lessons (Lonsdale et al., 2013).

One approach that has been shown to be effective in increasing PE students' levels of PA is the "Fair Play Game." The term *Fair Play*

Game is based on the Sport Education Fair Play Code of Conduct (Siedentop, Hastie, & van der Mars, 2011), which addresses students' participation, responsibility, effort, respect, and being a good sport that is helpful and not harmful to others. The development of the strategy was inspired by The Good Behavior Game (Barrish, Saunders, & Wolf, 1969), which aimed to decrease disruptive classroom behaviors in an elementary school. The Fair Play Game is a dependent group contingency strategy to help PE teachers to set goals for social or active behaviors and hold students accountable when working in teams. More specifically, the strategy consists of setting daily goals to teams and awarding points to when teams accomplish them. This is not done to produce competition between teams, but instead to provide a challenge within teams to overcome previous goals. It also includes public posting (i.e., a chart on the wall) of daily goals, teacher's prompts, and feedback about the desired behaviors to be accomplished by the teams. As a dependent group contingency strategy (Cooper, Heron, & Heward, 2007), the Fair Play Game requires the teacher to track one unidentified member of each team's performance against the goal-setting chart related to that particular team. If the unidentified team member accomplishes the daily goal, the team is awarded with a point, a mark, or a smiley face (Vidoni & Ulman, 2012). Every day a different unidentified member is randomly selected. As the selected individual is not identified, this typically results in the whole team making the effort to achieve the daily goal.

More recently, two studies showed positive effects of the implementation of the Fair Play Game (Vidoni, Azevedo, & Eberline, 2012; Vidoni, Lee, & Azevedo, 2014) on middle school students' active behaviors in PE lessons, measured with heart rate monitors and pedometers, respectively. However, despite the Fair Play Game strategy showing positive results in American middle to high socioeconomic class students, there is still a need to examine its effectiveness in a more underserved community, in which lower levels of PA are evident (Brodersen et al., 2007; Stalsberg & Pedersen, 2010).

In addition, the Fair Play Game has not yet been assessed using accelerometers, which provide an objective and more accurate measure of PA than do the previously used monitors (Trost, 2001; Trost, Loprinzi, Moore, & Pfeiffer, 2011). Therefore, the purpose of

this study was to investigate the effects of the Fair Play Game on objectively measured MVPA levels among secondary school students from an underserved area in the United Kingdom with different levels of PA, during PE lessons.

Method

Participants and Setting

Participants were from two classes: Year 8 (12–13 years old) and Year 9 (13–14 years old). They were boys from a secondary school in an underserved area of England, based on the index of multiple deprivation (IMD) and eligibility for free school meals (FSM). IMD is a small-area-based marker of deprivation based on measures of income, employment, health and disability, education, skills and training, barriers to housing and services, crime, and the living environment. Small areas, across England, are ranked from 1 to 32,482, with a rating of 1 indicating the most underserved and 32,482 being the least underserved (Noble et al., 2004). Eligibility for FSM is considered another proxy measure of deprivation. The school recruited for this study is located in an area of IMD of 5,376, therefore in the lowest quintile of deprivation in England. Furthermore, 48% of the students are entitled to FSM compared to an average of 16.3% in the country (Department for Education, 2013).

This study received ethical approval from the School of Health and Social Care at Teesside University (Study No 174/11). Prior to the study, the head teacher of the school received written information and provided informed consent. Twenty-one boys from each class then received an information pack containing a letter to their parent or guardian, an information sheet, a written informed consent form for their parent or guardian, and an assent form for the child. Students who were injured or presented any condition affecting their ability to undertake exercise were ineligible to participate. Eligible students who signed the assent form and returned a completed parental/guardian informed consent form were included in the study. In total, 12 students from Year 8 and nine students from Year 9 agreed to participate.

The school provided two 1-hr PE lessons per week. Because of a previously established curriculum, one PE lesson was allocated to gymnastics, delivered indoors, and the other to soccer, delivered

outdoors. The Fair Play Game study was conducted during 15 soccer lessons taught by the same teacher. Although the lesson content was chosen by the teacher, the option of soccer was appropriate for this intervention because it is an "invasion game." Previous Fair Play Game studies (Vidoni et al., 2012; Vidoni et al., 2014) were also conducted using invasion games (e.g., basketball and handball) as a unit of instruction.

The school PE teacher was also formally invited to participate and signed an informed consent. The PE teacher received training regarding the daily procedures of the intervention and a booklet including major components of the intervention, followed by a question and answer segment. The PE teacher had 8 years of teaching experience in PE including 5.5 years in this school.

Research Design

This study used a single-subject multiple baseline design across two classes (Cooper et al., 2007) to assess the effects of a dependent group contingency strategy, Fair Play Game, on students' PA levels during PE lessons. This design was chosen to examine the effect of the intervention among individual students and in two classes. Baseline data were collected in two classes in a staggered fashion to verify if the change on students' number of steps (used for goal setting) and percentage of lesson spent in MVPA were effected by the intervention. An extended baseline for Year 9 enabled repeated measures of students' levels of MVPA during the baseline (i.e., typical teaching) and intervention phases. This design has been used in general and adapted PE and in sport and PA interventions (Holt, Kinchin, & Clarke, 2012; Jull & Mirenda, 2016; Lieberman, Dunn, van der Mars, & McCubbin, 2000; Patrick, Ward, & Crouch, 1998; Samalot-Rivera & Porretta, 2013; Todd, Reid, & Butler-Kisber, 2010; Vidoni et al., 2014). Students in Year 8 started the intervention in their fifth soccer lesson, and those in Year 9 began the intervention in their 11th soccer lesson.

Procedures

The same PE teacher taught soccer lessons to both classes once a week for 15 weeks. The PE lesson lasted for 1 hr, but the active part of the lesson lasted for approximately 40 min. The lessons took place on an outdoor soccer field (approximately size: 100 m length and 60 m

width), during the end of autumn and throughout the winter season, and consisted of approximately: (a) 10 min of warm-up, (b) 15 min of drills, (c) 10 min of game, and (d) 5 min of closure.

In the first day of the soccer unit of instruction, the PE teacher divided the students from each class into four teams with five students on each team. Each team had a minimum of two and a maximum of three students who were participating in the study. The teacher explained that the participants would wear an accelerometer, which would measure their PA and steps during the lesson. The students were instructed to wear the accelerometer around the hip during the PE lesson. One accelerometer was assigned for each student, and they used the same accelerometer throughout the 15 lessons.

Baseline condition. The teacher taught typical soccer lessons during the first four days for the Year 8 class and 10 days for the Year 9 class. Participants were asked to wear the accelerometers, but goals were not established and there was no reinforcement in relation to effort.

Intervention. During the intervention, students were exposed to the Fair Play Game intervention package. The package consisted of the following:

- Goal setting: A chart was posted on the wall with information about goals set and goals achieved. The first goal was based on the average number of steps (measured by accelerometers) that the class took during the baseline condition.
- Prompts: The teacher prompted the students at the beginning of the lesson to "give their best effort" to increase the number of steps taken during the lesson. Examples of prompts used are "Let's go, let's go!," "Keep moving!," and "Pass and run!" During lesson closure, the teacher asked students to provide examples of how they could demonstrate effort during lessons, and students came up with the following ideas: moving on the field, passing the ball, engaging with their team, and avoiding staying still. Specifically, prompts were delivered at the beginning of each lesson segment (warm-up, practice and game, and closure). There was no control of how many prompts were delivered because the lesson was not videotaped, but at least one prompt was provided as a reminder at the beginning of each segment.

- Unidentified student: The teacher explained that one unidentified student per team would be monitored, and if this student accomplished the goal, the whole team would be awarded with a "YES" mark on the chart.
- Reinforcement: At the end of the lesson, the teacher pinpointed good examples of the students' active behaviors that were observed during the lesson, for example, staying active around the field, fast passes, getting the ball quickly when it went out of the field, and rapid transitions for defense or attack.
- Feedback: At the following PE lesson, the teacher then reviewed progress against the goal set on the chart. If the team achieved the goal, this was further increased by 200 steps for the current lesson, otherwise it remained the same.
- Reward: By the end of the 15-week observation period, each child from the teams that achieved 80% of the goals was rewarded with a Teesside University indoor soccer ball.

Social Validity

At the end of the intervention, all participants in the study, including the teacher, were invited to complete a social validity questionnaire (Vidoni et al., 2014). This was used to assess participants' acceptability of the behaviors that were reinforced, the procedures used, and social importance (Cooper et al., 2007).

The teacher was asked five questions related to the Fair Play Game strategy implementation: (a) if it was effective in increasing students' engagement in PE, (b) if it was complicated to implement, (c) if it impinged on the time needed for their usual PE instruction, (d) if it was an acceptable strategy to be used in all types of PE classes, and (e) if he would use the strategy in future classes. Responses to these questions were open-ended written comments.

The student questionnaire was anonymous and had four open-ended questions: (a) if they liked participating in the Fair Play Game and why, (b) if it was important to give the best effort during PE and why, (c) if their teammates showed their best effort during the lessons and why, and (d) what they did to show their best effort during the lessons.

Treatment Integrity

During the intervention, a checklist was used to verify the treatment integrity. The checklist for the first lesson included (a) if the teacher talked about best effort in the lesson, (b) if the teacher asked the students about examples of effort in the lesson, (c) if the teacher explained the chart on the wall, and (d) if the teacher explained that only one unidentified student per team would be targeted.

During the remaining lessons the checklist consisted of (a) reminding the students that one team member would be tracked, (b) prompting students to show their best effort during lessons, (c) giving feedback about good examples of effort during lessons, and (d) adding the result of the previous lesson to the chart. The checklist was completed by one of the researchers in all the sessions, and reliability was checked by a second researcher during 40% of the lessons.

Data Recording, Measures of the Dependent Variables and Analysis

Number of steps and MVPA were recorded using Actigraph GT1M accelerometers (Pensacola, FL, USA) during all lessons. Actigraph GT1M has been shown to provide a reliable measurement of counts and steps (Silva, Mota, Esliger, & Welk, 2010). Accelerometer data were recorded in every lesson at 15-s epochs, and accelerometers were set to initiate at the beginning of the PE lesson and stop at the end of the lesson. The exact start and finish times of the lessons were recorded manually by the researcher. Data were processed after each lesson, and the number of steps was checked for the selected participant in each team to establish if the goal was achieved.

Data were processed with Actilife (6.5.4) software (Actigraph, LLC, Pensacola, FL) and filtered to the period of each lesson. Evenson cut points (Evenson, Catellier, Gill, Ondrak, & McMurray, 2008) were applied to estimate MVPA during the lessons. These cut points are considered the most accurate to estimate time spent at different exercise intensities in children and adolescents from 5 to 15 years old (Trost et al., 2011). To account for variation in lesson time, results are presented as a percentage of lesson time in MVPA. The lesson time was recorded for each session. This consisted of the time between the beginning of warm-up to the end of the game, before the teacher provided the feedback for the students.

Only participants who attended a minimum of 80% of the lessons were included in the analysis. Three subjects from each class were selected for a single-subject analysis. The participants were selected according to their mean time spent in MVPA per lesson at baseline. The groups were subdivided as low, medium, and high MVPA, defined by the standard deviation of the mean: Low MVPA, < 0.3 *SD*; Medium MVPA, $\pm$ 0.3 *SD;* and High MVPA, > 0.3 *SD*. Participants from each category with the highest number of attendance were selected. A line graph was produced in which percentage of lesson time in MVPA in each session was plotted as a single datum point and connected to subsequent points throughout lessons. Results were analyzed as within and between conditions (baseline and intervention) for the three selected individuals in each class. Analyses of trend, level, and stability of the graphical data were based on the guidelines suggested by Lane and Gast (2014).

Results

The intervention was applied as planned in all the lessons. Interobserver reliability of treatment integrity showed 100% agreement across 40% of lessons.

Nine (out of 12 participating) students from Year 8 and seven (out of 9 participating) students from Year 9 attended 80% of the lessons and were included in the study. On average, the Year 8 participants ($n = 9$) increased MVPA from baseline to intervention from 41.7% to 49.1% (7.4% difference). Likewise, Year 9 participants ($n = 7$) increased MVPA from 49.7% at baseline to 58.3% at intervention (8.7% difference).

The Year 8 class had the set target of 1,800 steps for the first lesson. After 11 lessons, the target went up to 3,600 steps for one team (met the goal in 10 of 11 lessons, 91% of the goals accomplished). Two teams reached 3,400 steps (met the goal in nine of 11 lessons, 82% of the goals accomplished), and one team reached 3,200 steps (met the goal in eight of 11 lessons, 72% of the goals accomplished). For the Year 9 class, the first target was set as 2,700 steps. After five lessons, the target was raised to 3,100 steps for three teams (met the goal in four of five lessons, 80% of goals accomplished) and 2,900 steps for one of the teams (met the goal in three of five lessons, 60% of goals accomplished).

Figures 1 shows the percentage of lesson at MPVA of six participants with low, medium, and high MVPA at baseline from Years 8 and 9. As explained in the Method section, the selection of participants in each category was defined by standard deviation from the mean and based on highest attendance.

Low MVPA

Results from the visual analysis using the method suggested by Lane and Gast (2014) show that the participant with low MVPA from Year 8 presented a variable but positive change in trend (decelerating–deteriorating to accelerating–improving) and improvement in level between baseline and intervention. Likewise, there was a large magnitude of change confirmed by the percentage of nonoverlapping data (PND = 100%).

The participant with low MVPA from Year 9 showed a continuous positive pattern of trend direction (accelerating–improving), which did not change between the baseline and intervention periods, and there was a low PND (40%) between conditions. However, data appeared to improve in stability during the intervention (within stability envelope: baseline = 55.5% and intervention = 80%).

Functional relation is demonstrated when a controlled experiment shows that the change in the dependent variable is a reliable outcome of the specific manipulations of the intervention, rather than confounding variables (Cooper et al., 2007). Results from Figure 1 and visual analysis interpretation show that despite the positive change between the baseline and intervention phases for the low MVPA Year 8 student, a weak functional relation is demonstrated for low MVPA students given the lack of consistency during the replication with the low MVPA Year 9 student.

Medium MVPA

Results from the visual analysis (Lane & Gast, 2014) suggest that the participant with medium MVPA from Year 8 showed a positive pattern of change in trend (decelerating–deteriorating to accelerating–improving) and level. However, there was a low magnitude of change (Medium PND = 27.3%). In contrast to the Year 8 student, the participant with medium MVPA from Year 9 showed a negative trend, moving from accelerating–improving to decelerating–deteriorating and minimum or negative change in

level and PND. Therefore, based on Figure 1 and the visual analysis interpretation, a functional relation was not demonstrated for the medium MVPA students.

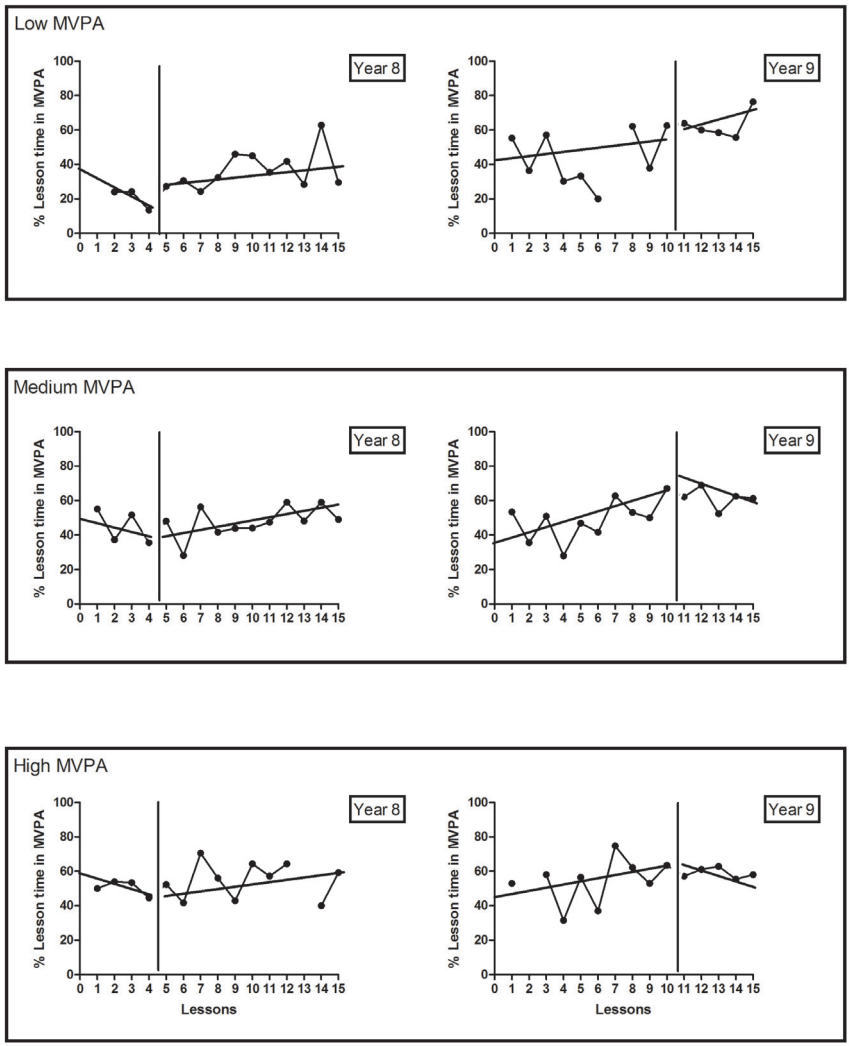

Figure 1. Percentage of lesson time in MVPA in children with low, medium, and high MVPA at baseline based on attendance. Missing points indicate absence in lesson.

High MVPA

The participant with high MVPA from Year 8 showed nearly the same positive pattern of change in trend (decelerating–deteriorating to accelerating–improving) compared to the low and medium MVPA participants. However, there was a relatively low magnitude of change (High PND = 60%). In contrast to the Year 8 student, the participant with high MVPA from Year 9 showed a negative trend, moving from accelerating–improving to decelerating–deteriorating and a negative change in level and 0% PND. Therefore, the results from Figure 1 and visual analysis interpretation (Lane & Gast, 2014) show that a functional relation cannot be confirmed for the high MVPA students.

Social Validity Questionnaires

Teacher's responses. The acceptability of the strategy was verified by the social validity questionnaire. The teacher responded that the Fair Play Game helped students to extend their levels of engagement in the lessons. He reported that the strategy was not complicated; however, PE teachers might have other learning targets rather than fitness. The teacher felt that the Fair Play Game strategy took time away from learning soccer technique and knowledge. He reported that the use of accelerometers as a strategy would not be effective if the focus of the lesson was on teaching skill, development, and tactics. However, the teacher responded that he would use Fair Play Game strategy again to help some students to increase their engagement in the lesson.

Students' responses. Twenty students responded to the questionnaire (12 students from Year 8 and eight students from Year 9). All students responded that they liked participating in the study. The majority of the students responded that Fair Play Game was fun and challenging. Other students responded that they liked knowing the number of steps taken and that they got to play more soccer.

The majority of students responded that being told to "give your best effort" in PE class is important because it helped them to be fit and move more. The majority of students reported that their teammates showed their best effort in the PE classes. Other students responded that some teammates did not give their best effort because they were not participating in the study. Students responded that to

show their effort they did not stop jogging or running during the lesson, they tried harder, and they also accomplished the tasks proposed by the teacher.

Discussion

The purpose of this study was to investigate the effect of a group contingency strategy, Fair Play Game, using accelerometers. The researchers also examined for the first time the effects of the Fair Play Game strategy on PE students from an underserved area outside the United States. Single-subject analysis revealed that the Fair Play Game intervention showed a positive but weak treatment effect on low active participants. Students with medium and high MVPA did not show positive changes between baseline and intervention phases.

The results from this study do not support the findings of previous studies in which the Fair Play Game strategy has been applied in PE classes (Vidoni et al., 2012; Vidoni et al., 2014). Several reasons might explain these differences in results. One possible reason is that the intervention was only delivered on 1 day/week. Therefore, the intervention took 3 months to complete because of several school breaks. In previous studies (Vidoni et al., 2012; Vidoni et al., 2014), students were exposed to daily PE lessons; therefore, the intervention was delivered continually. It is known that dose (intensity, frequency, and duration) of delivering school-based PA is an important determinant of practice efficiency (Sun et al., 2013). Although the duration of the actual intervention was similar to that in other interventions (14 to 17 days, 35 to 45 min long), the frequency at which it was delivered (weekly) was considerably lower in this study compared to previous studies.

Another possible reason was that the soccer lessons were delivered on an outdoor soccer field during the winter season, whereas in previous studies similar interventions were delivered in a gymnasia (Vidoni et al., 2012; Vidoni et al., 2014). Although prompts, feedback, and goal settings were provided in the same manner as in previous studies, the varied weather conditions might have affected students' participation in the classes. It has been stated that environmental variables in specific weather need to be considered when developing PA interventions (Tucker & Gilliland, 2007), and poor weather has been identified as a barrier to being physically active (Belanger, Gray-Donald, O'Loughlin, Paradis, & Hanley, 2009). Furthermore,

despite the researchers' efforts to provide prompts in a consistent manner, they did not recorded the number of prompts provided. The lack of information concerning the number of prompts delivered during the lesson is a limitation of this study. Vidoni and Ward (2009) found that when the teacher did not deliver prompts, the occurrence of target behaviors decreased compared to when the teacher frequently delivered prompts. In addition, in previous studies the participants were from schools located in middle to high socioeconomic areas in the United States, whereas in this study the school was located in an underserved area of England. Previous studies performed in America show that children attending schools in high socioeconomic areas have 4.4 min/day more of MVPA compared to children who attend schools in low socioeconomic areas (Carlson et al., 2014). Similarly, British adolescents (11–12 years old) from low socioeconomic areas present higher levels of sedentary behavior compared to children from affluent areas (Brodersen et al., 2007). Therefore, the unsuccessful results seen in this study might be partly associated with a population that is potentially more physically inactive and therefore might require different triggers to change their behaviors.

The number of students involved in this study was low compared to that in previous studies (Vidoni et al., 2012; Vidoni et al., 2014). Less than 60% of the students from the Year 8 class and 40% of students from the Year 9 class agreed to participate in the study. Although researchers explained the importance of the study and mentioned the incentive at the end, few students provided the signed parental/guardian informed consent. Considering that goals were set to individuals within a team and that not all students in the team were participating in the intervention, this might have prevented individuals who were participating in the study from showing their best effort. Perhaps if all participants were placed within the same groups it would encourage their team affiliation and would affect the results.

Similarly, it is important to note that only one teacher responded to the social validity questionnaire, and his views might not be representative of most teachers' opinions. The PE teacher emphasized that "not all PE lessons are about fitness." It is known that the goals of PE are wider than fitness and include improvement of motor competen-

cies, knowledge of principles and concepts, and development of personal and social skills (National Association for Sport and Physical Education & American Heart Association, 2012). However, this intervention was limited to target MVPA in PE classes. Although the intervention package was implemented as planned (fidelity of treatment), it could be suggested that the teachers' prompts or feedback to students was not enough to increase students' levels of participation. As mentioned before, it is also possible that this particular group of children requires more frequent and/or varied stimuli to change their behavior in class.

One limitation of this study was the use of a multiple baseline across two classes. Although it involved three replications across students (low, medium, and high MVPA), it demonstrated a relatively weak experimental control. Perhaps a third tier in the multiple baseline design would provide a better representation of replications, predictions, and verifications of the experiment.

This study has some strengths including a more accurate measure of PA (i.e., accelerometers) compared to other studies in which the the same intervention was applied (i.e., heart rate monitors and pedometers; Vidoni et al., 2012; Vidoni et al., 2014). Accelerometers are considered the most valid objective measure of PA (Eston, Rowlands, & Ingledew, 1998). However, the use of accelerometers in everyday practice might be unfeasible because of the cost of equipment and skills necessary for data processing. The use of pedometers might be more appropriate for everyday use. However, the limitations of using pedometers to measure PA should be considered, such as inability to measure nonambulatory activities (McNamara, Hudson, & Taylor, 2010).

It is also important to understand the contribution of PE toward helping children to meet the minimum guidelines for PA. Accelerometry data from Health Survey England 2008 indicate that only 7% of the boys aged 11 to 15 meet the current recommendation of at least 60 min/day of MVPA (Health Survey for England, 2008). Schools, in particular PE classes, are seen as important settings for PA promotion (Bailey, 2006). Fair Play Game might be an important strategy to support children to increase MVPA during PE lessons (U.S. Department of Health and Human Services, 2010). However, it is important to note that the frequency at which the intervention is

delivered and the number of students in class who are participating in the intervention are important for the intervention to be effective.

In summary, Fair Play Game might be an important strategy to increase MVPA in low active children during PE lessons. The use of this strategy might support the objective stated by Sallis et al. (2012) that PE classes should focus on health-related PA and fitness and that students should be active for at least 50% of the lesson time.

References

Bailey, R. (2006). Physical education and sport in schools: A review of benefits and outcomes. *Journal of School Health, 76,* 397–401. https://doi.org/10.1111/j.1746-1561.2006.00132.x

Barrish, H. H., Saunders, M., & Wolf, M. (1969). Good behavior game: Effects of individual contingencies for group consequences on disruptive behavior in a classroom. *Journal of Applied Behavior Analysis, 2,* 119–124. https://doi.org/10.1901/jaba.1969.2-119

Belanger, M., Gray-Donald, K., O'Loughlin, J., Paradis, G., & Hanley, J. (2009). Influence of weather conditions and season on physical activity in adolescents. *Annals of Epidemiology, 19*, 180–186. https://doi.org/10.1016/j.annepidem.2008.12.008

Brodersen, N. H., Steptoe, A., Boniface, D. R., & Wardle, J. (2007). Trends in physical activity and sedentary behaviour in adolescence: Ethnic and socioeconomic differences. *British Journal Sports Medicine, 41,* 140–144. https://doi.org/10.1136/bjsm.2006.031138

Carlson, J. A., Mignano, A. M., Norman, G. J., McKenzie, T. L., & Kerr, J. (2014). Socioeconomic disparities in elementary school practices and children's physical activity during school. *American Journal of Health Promotion, 28,* S47–S53. https://doi.org/10.4278/ajhp.130430-QUAN-206

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied behavior analysis.* Upper Saddle River, NJ: Merrill/Prentice Hall.

De Bourdeaudhuij, I., Van, C. E., Spittaels, H., Oppert, J. M., Rostami, C., Brug, J., & Maes, L. (2011). School-based interventions promoting both physical activity and healthy eating in Europe: A systematic review within the HOPE project. *Obesity Reviews, 12,* 205–216. https://doi.org/10.1111/j.1467-789X.2009.00711.x

Department for Education. (2013). *Schools, pupils, and their characteritics: January 2013.* Retrieved from https://www.gov.uk/government/statistics/schools-pupils-and-their-characteristics-january-2013

Eston, R. G., Rowlands, A. V., & Ingledew, D. K. (1998). Validity of heart rate, pedometry, and accelerometry for predicting the energy cost of children's activities. *Journal of Applied Physiology, 84,* 362–371.

Evenson, K. R., Catellier, D. J., Gill, K., Ondrak, K. S., & McMurray, R. G. (2008). Calibration of two objective measures of physical activity for children. *Journal of Sports Sciences, 26,* 1557–1565. https://doi.org/10.1080/02640410802334196

Fairclough, S., & Stratton, G. (2005). Physical activity levels in middle and high school physical education: A review. *Pediatric Exercise Science, 17,* 217–236. https://doi.org/10.1123/pes.17.3.217

Health Survey for England. (2008). *Health survey for England 2008: Physical activity and fitness*: *Volume 1.* Leeds, England: NHS Information Centre for Health and Social Care.

Holt, J. E., Kinchin, G., & Clarke, G. (2012). Effects of peer-assessed feedback, goal setting, and a group contingency on a performance and learning by 10–12-year-old academy soccer players. *Physical Education and Sport Pedagogy, 17,* 231–250. https://doi.org/10.1080/17408989.2012.690568

Jull, S., & Mirenda, P. (2016). Effects of a staff training program on community instructors' ability to teach swimming skills to children with autism. *Journal of Positive Behavior Interventions, 18*(1), 29–40. https://doi.org/10.1177/1098300715576797

Kahn, E. B., Ramsey, L. T., Brownson, R. C., Heath, G. W., Howze, E. H., Powell, K. E., & Corso, P. (2002). The effectiveness of interventions to increase physical activity: A systematic review. *American Journal of Preventive Medicine, 22,* 73–107. https://doi.org/10.1016/S0749-3797(02)00434-8

Lane, J. D., & Gast, D. L. (2014). Visual analysis in single case experimental design studies: Brief review and guidelines. *Neuropsychological Rehabilitation, 24,* 445–463. https://doi.org/10.1080/09602011.2013.815636

Lieberman, L. J., Dunn, J. M., van der Mars, H., & McCubbin, J. (2000). Peer tutors' effects on activity levels of deaf students in inclusive elementary physical education. *Adapted Physical Activity Quarterly, 17,* 20–38. https://doi.org/10.1123/apaq.17.1.20

Lonsdale, C., Rosenkranz, R. R., Peralta, L. R., Bennie, A., Fahey, P., & Luban, D. R. (2013). A systematic review and meta-analysis of interventions designed to increase moderate-to-vigorous physical activity in school physical education lessons. *Preventive Medicine, 56,* 152–161. https://doi.org/10.1016/j.ypmed.2012.12.004

McNamara, E., Hudson, Z., & Taylor, S.J. (2010). Measuring activity levels of young people: The validity of pedometers. *British Medical Bulletin, 95,* 121–137. https://doi.org/10.1093/bmb/ldq016

National Association for Sport and Physical Education & American Heart Association. (2012). *2012 Shape of the nation report: Status of physical education in the USA.* Reston, VA: American Alliance for Health, Physical Education, Recreation, and Dance.

Noble, M., Right, G., Dibben, C., Smith, G., McLennnan, D., Antila, A., & Braswell, S. (2004). *The English indices of deprivation 2004.* London, England: Neighbourhood Renewal Unit, Office of the Deputy Prime Minister.

Patrick, C. A., Ward, P., & Crouch, D. W. (1998). Effects of holding students accountable for social behaviors. *Journal of Teaching in Physical Education, 17,* 143–156. https://doi.org/10.1123/jtpe.17.2.143

Sallis, J. F., & McKenzie, T. L. (1991). Physical education's role in public health. *Research Quarterly for Exercise & Sport, 62,* 124–137. https://doi.org/10.1080/02701367.1991.10608701

Sallis, J. F., McKenzie, T. L., Beets, M. W., Beighle, A., Erwin, H., & Lee, S. (2012). Physical education's role in public health: Steps forward and backward over 20 years and HOPE for the future. *Research Quarterly for Exercise & Sport, 83,* 125–135. https://doi.org/10.1080/02701367.2012.10599842

Samalot-Rivera, A., & Porretta, D. (2013). The influence of social skills instruction on sport and game related behaviours of students with emotional or behavioural disorders. *Physical Education and Sport Pedagogy, 18,* 117–132. https://doi.org/10.1080/17408989.2011.631004

Siedentop, D., Hastie, P., & van der Mars, H. (2011). *Complete guide to Sport Education.* Champaign, IL: Human Kinetics.

Silva, P., Mota, J., Esliger, D., & Welk, G. (2010). Technical reliability assessment of the Actigraph GT1M accelerometer. *Measurement in Physical Education and Exercise Science, 14,* 79–91.https://doi.org/10.1080/10913671003715524

Stalsberg, R., & Pedersen, A. V. (2010). Effects of socioeconomic status on the physical activity in adolescents: A systematic review of the evidence. *Scandinavian Journal of Medicine & Science in Sport, 20,* 368–383. https://doi.org/10.1111/j.1600-0838.2009.01047.x

Sun, C., Pezic, A., Tikellis, G., Ponsonby, A. L., Wake, M., Carlin, J. B., & Dewyer, T. (2013). Effects of school-based interventions for direct delivery of physical activity on fitness and cardiometabolic markers in children and adolescents: A systematic review of randomized controlled trials. *Obesity Reviews, 14,* 818–838. https://doi.org/10.1111/obr.12047

Todd, T., Reid, G., & Butler-Kisber, L. (2010). Cycling for students with ASD: Self-regulation promotes sustained physical activity. *Adapted Physical Activity Quarterly, 27,* 226–241. https://doi.org/10.1123/apaq.27.3.226

Trost, S. G. (2001). Objective measurement of physical activity in youth: Current issues, future directions. *Exercise and Sport Sciences Reviews, 29*, 32–36. https://doi.org/10.1097/00003677-200101000-00007

Trost, S. G., Loprinzi, P. D., Moore, R., & Pfeiffer, K. A. (2011). Comparison of accelerometer cut points for predicting activity intensity in youth. *Medicine & Science in Sports & Exercise, 43,* 1360–1368. https://doi.org/10.1249/MSS.0b013e318206476e

Tucker, P., & Gilliland, J. (2007). The effect of season and weather on physical activity: A systematic review. *Public Health, 121,* 909–922. https://doi.org/10.1016/j.puhe.2007.04.009

U.S. Department of Health and Human Services. (2000). *Healthy People 2010* (Conference ed.). Washington, DC: U.S. Government Printing Office.

U.S. Department of Health and Human Services. (2010). *Strategies to improve the quality of physical education.* Retrieved from https://www.cdc.gov/healthyschools/pecat/quality_pe.pdf

van Sluijs, E. M., McMinn, A. M., & Griffin, S. J. (2008). Effectiveness of interventions to promote physical activity in children and adolescents: Systematic review of controlled trials. *British Journal of Sports Medicine, 42,* 653–657. https://doi.org/10.1136/bmj.39320.843947.BE

Vidoni, C., Azevedo, L. B., & Eberline, A. (2012). Effects of a group contingency strategy on middle school physical education students heart rates. *European Physical Education Review, 18,* 78–96. https://doi.org/10.1177/1356336X11430652

Vidoni, C., Lee, C. H., & Azevedo, L. B. (2014). Fair Play Game: A group contingency strategy to increase students' active behaviours in physical education. *Early Child Development and Care, 184,* 1127–1141. https://doi.org/10.1080/03004430.2013.847834

Vidoni, C., & Ulman, J. (2012). The fair play game: Promoting social skills in physical education. *Strategies, 25,* 26–30. https://doi.org/10.1080/08924562.2012.10592149

Vidoni, C., & Ward, P. (2006). Effects of a dependent group-oriented contingency on middle school physical education students' fair play behaviors. *Journal of Behavioral Education, 15,* 80–91. https://doi.org/10.1007/s10864-006-9012-z

Instructions for Authors
The Physical Educator

Author manuscripts must be submitted online (http://js.sagamorepub.com/pe/information/authors) and meet the following guidelines:

Manuscripts must be double spaced in Times New Roman 12-point font in a Microsoft Office Word document. Number the lines of the manuscript, including the references. Manuscripts should be 25 pages or fewer in length, including charts, graphs, graphics, pictures, and tables. Please follow APA 6th edition style guidelines consistently throughout the manuscript.

The first page of the manuscript must include the title of the article only. Do not include your name, affiliation, or other identifying information. An abstract must accompany each manuscript.

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.

Carefully check references to ensure they are correct, included only when they are cited in the text using APA 6th edition style guidelines. Only include references that have been published or accepted for publication.

Upon submission, authors will be sent an e-mail of receipt. Manuscripts are read by the editor and three reviewers using a blind review process that takes up to 90 days. Authors will be notified about the disposition of their manuscripts as soon as reviewers have returned their reviews. Depending on the outcome of the review, authors will receive one of the following notices:

1. An e-mail of acceptance certifying the article will be published in the near future.

2. An e-mail of rejection and copies of reviewers' comments.

3. An e-mail recommending revision and copies of reviewers' comments and suggested revisions. A due date will be listed for resubmission of the revised manuscript.

Galley proofs will be e-mailed to the lead author and must be returned within 72 hours of receipt. Only minor corrections may be made at this point. New additions or major revisions are not allowed. Reprints of articles are not available at this time. The lead author will receive an electronic copy of the issue that is to be distributed to coauthors only.