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ASSESSMENT

Effects of a Sound Field Amplification System on Teacher Movement in Physical Education Settings

Stuart Ryan, Michael Maina, Julie Maina

Abstract

This study determined the effect of a sound field amplification system on teacher movement in physical education (PE) settings. Two middle school PE teachers instructing coeducational PE classes were used as the subjects. This investigation used a multiple-baseline single-case design across subjects. The treatment (independent variable) was the teacher using a portable sound field amplification system. The results indicated consistency in the increase of teacher movement for all classes when amplified feedback was implemented, which suggests that the treatment was effective.

Researchers have consistently investigated techniques to improve and better understand teaching strategies that will increase teacher effectiveness. In the past, the professional literature has suggested that high levels of teacher movement can enrich teacher effectiveness (Pangrazi & Beighle, 2012; Rink, 2012). Several studies have emphasized that teacher mobility, or active supervision, is an integral part of smoothly run classes (Anderson, Evertson, & Brophy, 1979; Fifer, 1986; Wong, 1972). Active supervision comprises several

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behavior dimensions, including physical relocation (i.e., movement), proximity to students, visual scanning, length and distribution of interaction with individual students, and provision of feedback on both conduct and staff performance (Brooks, 1985).

In a study using first grade reading groups, Anderson, Evertson, and Brophy (1979) found that students in classes where teachers positioned themselves in locations that allowed them to monitor all the students had greater achievement scores than students in classes where teachers did not position themselves in this manner. Teachers who could scan the room continuously were able to respond more quickly to potential disruptive situations. Continuous monitoring also sent a message to the students that the teacher was well aware of what was going on in the classroom. Furthermore, teachers are advised not to spend too much time with a single student, to avoid spending unnecessary amounts of time in the center of the activity area (Doyle, 1979). Graham (2016) advocated teachers stay on the periphery of the activity area, calling this strategy teaching with your "back to the wall." This ensures that most students can be kept in view and will remain focused on their tasks.

In a study by van der Mars, Darst, Vogler, and Cusimano, (1994), supervision patterns of elementary physical educators were examined in relation to work involvement patterns of students in each teacher's class. The supervision patterns analyzed included teacher location, rate of movement, and provision of verbal feedback. Work involvement by students included on-task, off-task, total motor engagement, and successful motor engagement (ALT-PE). The findings revealed that teachers spent more time along the periphery of the activity area, were positioned more along the sides, and were active movers. Teacher movement is also associated with students' on-task behaviors. These types of monitoring strategies, when used by physical educators, help to guarantee the best use of practice time (Siedentop & Tannehill, 2001). Siedentop and Tannehill (2001) noted that teachers who moved throughout the teaching area helped students to stay on task. Their mobility also enabled the teachers to distribute prompts and feedback more evenly to all students.

Given the importance of teacher movement, research has provided limited strategies for increasing the levels of teacher movement, which in turn should increase teacher supervision and

teacher effectiveness. Recent research in physical education (PE) settings using sound field amplification systems (Ryan, 2009; Ryan, Ormond, Imwold, & Rotunda, 2002), also known as public address (PA) systems, has shown potential for increasing certain areas of teacher effectiveness.

Berg (1993) suggested that perhaps the most cost-effective, appropriate, and suitable strategy for maximizing the learning environment is the use of sound field amplification systems. Allen and Anderson (1995) described this technology as a "piece of equipment that teachers will fight to keep once they try it in their classrooms" (p. 201). An amplification device may improve the classroom signal-to-noise ratio by approximately 8 to 10 dB or more, and enables all children to listen and the teachers to use a comfortable voice level regardless of where the students or the teacher are positioned (McSporran, Butterworth, & Rowson, 1997). A sound field amplification device or PA system typically consists of a small microphone and an FM transmitter worn by the PE teacher, an amplifier, and a stationary FM receiver with one or more speakers (Ryan, 2010a). Some devices are rechargeable and have a built-in CD player, while other systems fit around the teacher's waist and keep the hands free (Ryan, 2010a).

There is growing research and information related to the use and effectiveness of sound amplification in classrooms and in PE settings (Crandell, Smaldino, & Flexer, 2005; Ryan, 2009, 2010a, 2010b; Ryan & Mendel, 2010; Ryan et al., 2002). With large amounts of classroom management time devoted to PE classes (Ryan, 2010b), investigating methods for increasing teacher movement may increase teacher effectiveness. Therefore, this research examined the effect of a sound amplification system on teacher movement in PE settings.

Method

Participants and Settings

Two European American female middle school physical education teachers located at two schools in Northwest Florida participated in this study. One school was located in an inner city, and the other was considered rural. Prior to data collection, human subject consent was obtained from both participants. Each teacher taught three classes of sixth, seventh, and eighth grade coeducational

PE students, and the classes contained between 25 and 37 students. Both teachers were observed during a 2-month period in which the activities of volleyball, soccer, and tennis were held outside on the activity areas of both schools. For both schools, the dimension of the volleyball courts was 80 × 80 ft; soccer fields, 300 × 150 ft; and tennis courts, 160 × 120 ft.

Target Behavior and Observation Procedure

Data were collected from live recording sessions of teacher participants. The Teacher Monitoring Analysis System (TMAS; van der Mars, Cusimano, & Ruppert, 1989) measured teacher movement. The location of the teacher was identified via the numbered location chart (see Figure 1), and the number of sector changes the teachers made for each class in a 30-min session was measured via the event recording. Teacher movement data provide an indication of the degree to which teachers move about the activity area to observe or interact with students. The data for each teacher were then converted to mean scores of sector changes for each intervention. For example, the movement rate for Teacher 1 during same sector feedback may be 8, 10, 9, and 13 sector changes for a mean score of 10.

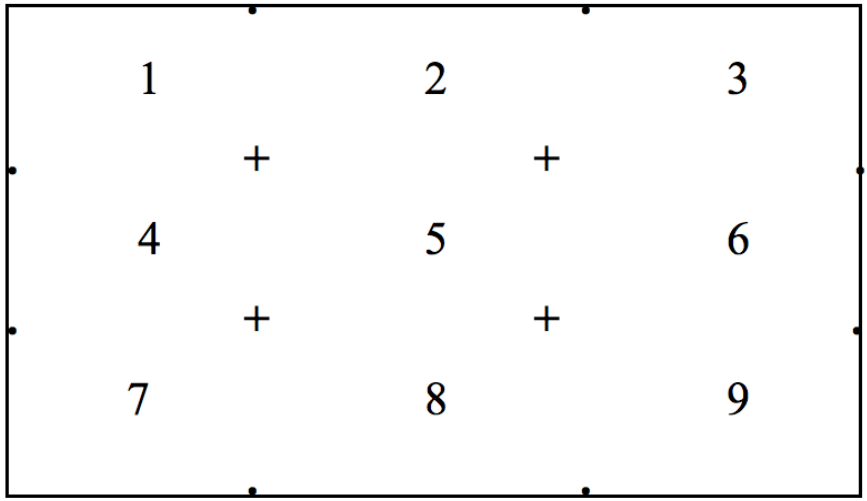

Figure 1. Configuration of sector layout. + = white line. • = cone.

Two graduate students coded the data. Prior to the observation assessment, the guidelines for using the TMAS were presented and learned. Practice observations were conducted during three sessions of a field test. The coders were ready to record once a predetermined criterion of 80% agreement between coders had been reached on identifying levels of teacher movement. Three baseline phase and three intervention phase class periods for each grade were randomly selected as a way of determining interobserver agreement. The variable of identifying teacher movement was compared by observers using the interval-by-interval method and produced percentages ranging from 88% to 97% with a mean of 92%.

Experimental Design and Procedure

The experimental design used in this investigation was a multiple baseline design across subjects. At the intervention phases, the treatment variable of the teacher providing feedback using sound field amplification was in effect and changes in teacher movement were noted. To reduce the possibility of the activity influencing the results, the teachers never changed the activities during the introduction of an intervention. Also, at no time prior to or during the study were the teachers informed of the dependent measure of teacher movement. Prior to the intervention, teachers were instructed to wear a headset with a microphone placed 1 in. from the mouth while continuing their typical teaching methods. The microphone amplified their feedback using a portable sound field amplification system that was worn around their waist (LightSpeed, Model PA-3). The headset was connected to the portable sound field system by a wire, and the volume, which was located on the portable waist pack, was adjusted by the teachers to fit the physical settings and the number of students. The teachers were given instructions prior to each daily observation to use the same managerial and instructional methods as they typically used, but with sound field amplification feedback. The teachers were instructed to switch off the microphone if they needed to give personal feedback, instruction, or discipline that may cause embarrassment for the student(s) if it was broadcasted for all students to hear.

Results

Table 1 shows the mean frequency of teacher movement data for all periods. The mean frequency of teacher movement during class clearly shows an increase when the teacher is using sound field amplification feedback with PE students. The occurrence of increased teacher movement by sound field amplification feedback was related by individual class groups and by the total of the classes studied.

Table 1
Mean Frequency of Teacher Sector Change Across Experimental Conditions

		Unamplified		Amplified	
Teacher	**Grade**	***M***	**(*SD*)**	***M***	**(*SD*)**
1	6	9.2	(2.88)	18.5	(2.69)
	7	9.1	(2.23)	17.3	(4.79)
	8	9.3	(2.41)	14.5	(1.75)
2	6	8.8	(1.47)	15.0	(3.28)
	7	9.4	(1.78)	17.0	(4.20)
	8	10.3	(2.21)	21.0	(2.15)

Examining the data by individual class provided a chronological level of teacher movement under the replications of unamplified and amplified feedback given by the teachers (see Figures 2 and 3). The trends that emerged were consistent with the group means and individual class group means. Figures 2 and 3 present information on the variability from session to session of teacher movement but support the overall pattern of increase. The effectiveness of the interventions can be found in the changes in the level between amplified and unamplified interventions.

Figures 2 and 3 also display the point of activity change for each period. Teacher 1 during the sixth grade PE class displayed an average of 9.2 sector changes during unamplified feedback and 18.5 during sound field amplification feedback (see Table 1). Teacher 1 during the seventh grade PE class had an average of 9.1 sector changes during unamplified feedback and 17.3 during sound field

amplification feedback, and during the eighth grade PE class had 9.3 sector changes during unamplified feedback and 14.5 sector changes during sound field amplification feedback. Teacher 2 during the sixth grade PE class displayed an average of 8.8 sector changes during unamplified feedback and 15.0 during sound field amplification feedback (see Table 2). Teacher 2 during the seventh grade PE class had an average of 9.4 sector changes during unamplified feedback and 17.0 during sound field amplification feedback, and during the eighth grade PE class had 10.3 sector changes during unamplified feedback and 21.0 during sound field amplification feedback. Two-tailed *t* tests compared the overall mean frequency of teacher sector change in unamplified and amplified settings. The findings showed that for both teachers and all grades, amplified teacher sector change was significantly ($p < .05$) higher than unamplified teacher sector change.

The results of the sound field amplification feedback interventions for both teachers and all grades clearly show a consistent increase in teacher movement. The change and type of activity appears to have little effect on the results regardless if the activity changed from a noninvasive game (volleyball and tennis) to a possession/invasion game (basketball).

Discussion

This study determined the effect of a sound field amplification system on teacher movement in middle school PE settings. The results indicated consistency in the increase of teacher movement for all classes when amplified feedback was implemented, which suggests that the treatment was effective. The frequency of teacher movement is higher than that in a prior study by Ryan and Yerg (2002), which is likely due to smaller size of activity area and high fitness levels of teachers. The increase in teacher movement in this study is supported by Crandell et al. (2005), who stated that teachers

> need to use less energy projecting their voices; they have less vocal abuse and are less tired by the end of the day. Teachers also report that the sound field amplification system increases their efficiency as teachers, requiring fewer repetitions and thus allowing for more actual time teaching. (p. 14)

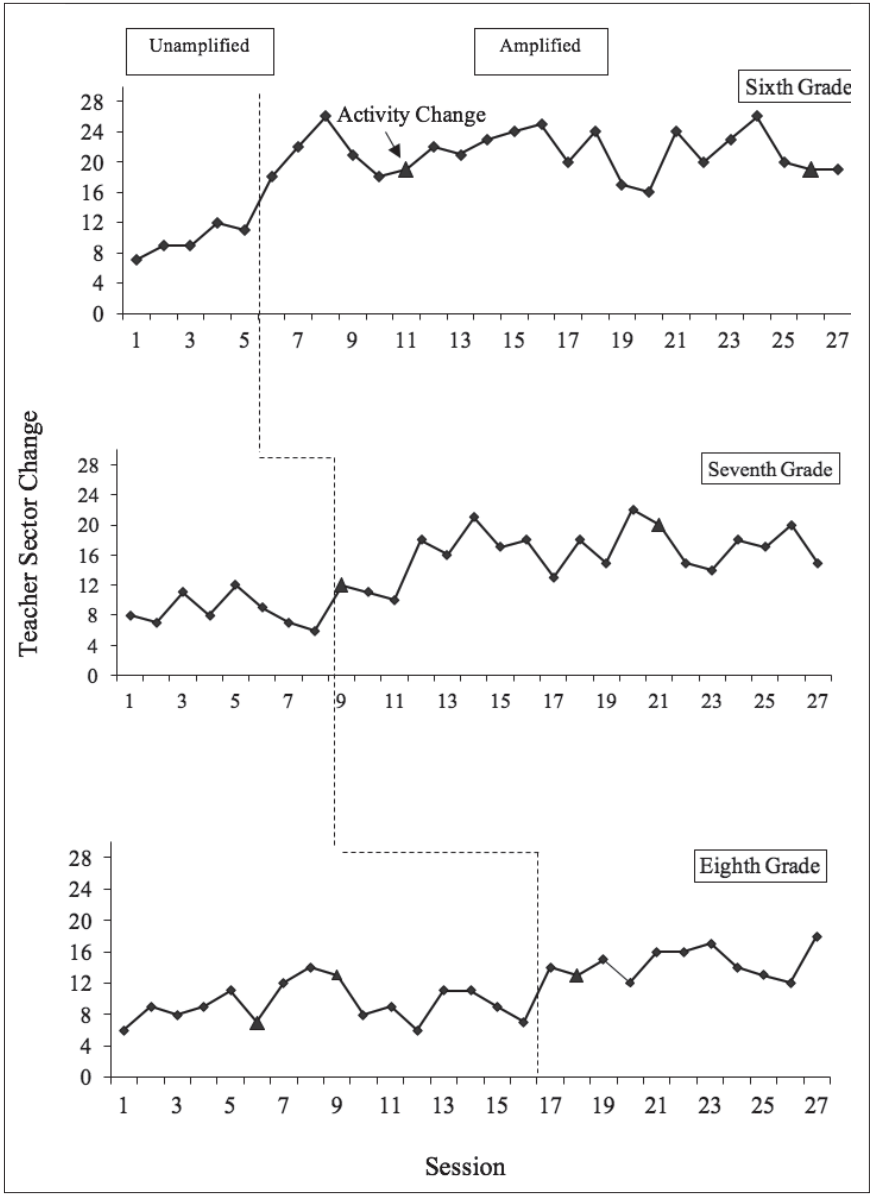

Figure 2. Teacher 1 sector change across experimental conditions.

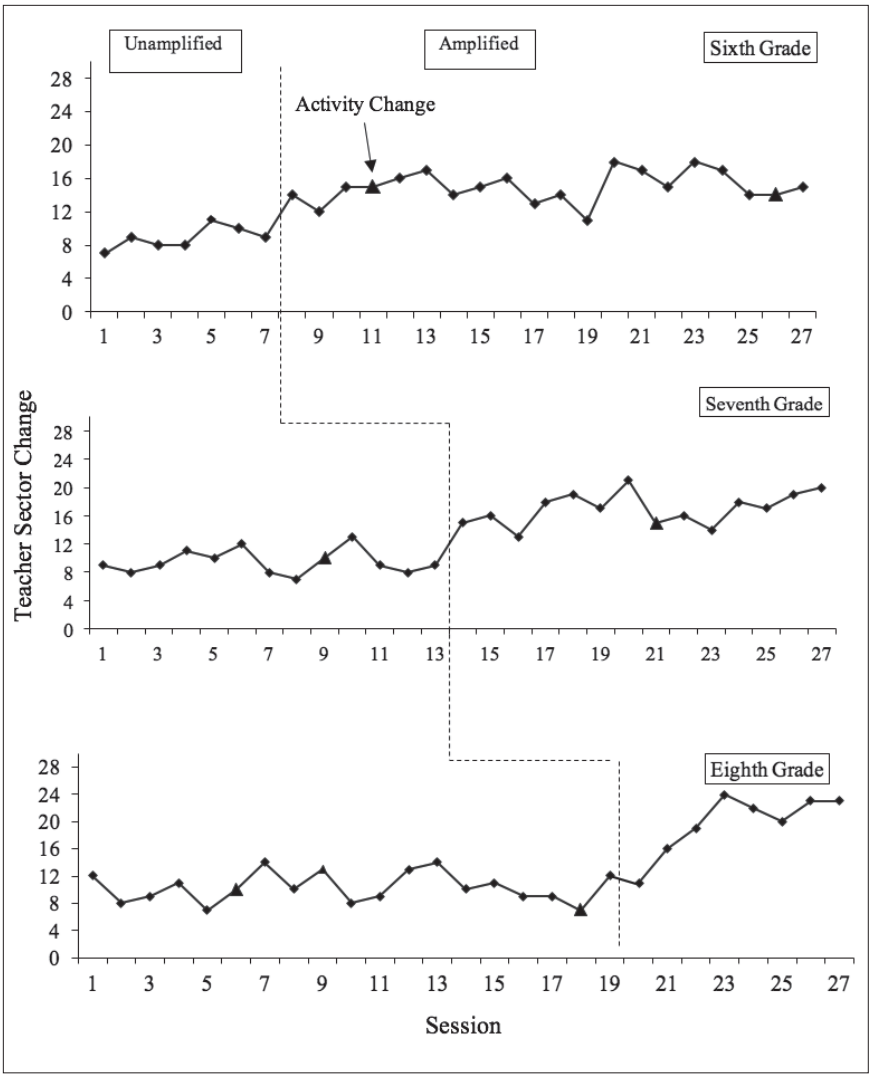

Figure 3. Teacher 2 sector change across experimental conditions.

A study of voice issues related to PE teachers indicated a strong prevalence and impact of voice problems for almost all PE teachers surveyed regardless of grade level taught, age, or gender (Ryan, Rotunda, Song, & Maina, 2012). Teachers with more energy, less voice strain, and less time repeating instruction may be able to spend more teaching time moving around the activity area, which is important to student achievement. In addition, studies have also shown that in amplified conditions, elementary students were more attentive, less distracted (Allen & Patton, 1990), and more on-task (Ryan et al., 2002). Amplified feedback is associated with distal feedback, also known as "crossgroup feedback," and has been shown to reduce management feedback and student off-task behavior (Ryan & Yerg, 2001). Reduced need for management feedback and reduced student off-task behavior may allow teachers more time for active supervision and teacher movement.

Teachers who actively move about the activity area can attend to more students. Active teacher movement during fitness instruction has resulted in students being less likely to be lying down and inactive during class (van der Mars, Darst, Volger, & Cusimano, 1994). A study of supervision patterns found that active movement around the periphery correlated with students' total engagement in motor tasks and with successful motor engagement (ALT-PE; Sariscsany, Darst, & van der Mars, 1995).

The research supports the importance of teacher movement and active supervision in PE settings. Teaching strategies that increase levels of teacher movement should in turn increase teacher effectiveness and student learning. The results of this study support the use of sound field amplification systems in PE settings as a technique for increasing teacher movement.

This research further extends the use of behavioral technologies in a school setting outside the classroom and provides an effective tool for increasing teacher movement in a PE setting, which may enrich teacher effectiveness and student learning. Forthcoming efforts to study the effects of sound field amplification feedback in the area of student work involvement and skill development may provide additional insight into effective teaching components. Discovering new and better ways to be more effective will always be an objective of educators, and sound field amplification may be an additional tool that improves teacher effectiveness and enhances student learning.

References

Allen, L., & Anderson, K. (1995). Marketing sound-field amplification systems. In C. Crandell, J. Smaldino, & C. Flexer (Eds.), *Sound-field FM amplification: Theory and practical applications* (pp. 218–231). San Diego, CA: Singular.

Allen, L., & Patton, D. (1990). *Effects of sound-field amplification on students' on-task behavior*. Paper presented at the American Speech, Language, and Hearing Convention, Seattle, WA.

Anderson, L., Evertson, C., & Brophy, J. (1979). An experimental study of effective teaching in first grade reading groups. *Elementary School Journal, 79,* 193–222.

Berg, F. S. (1993). *Acoustics and sound systems in schools.* San Diego, CA: Singular.

Brooks, D. M. (1985). Beginning the year in junior high: The first day of school. *Educational Leadership, 42*(8), 76–78.

Crandell, C. C., Smaldino, J. J., & Flexer, C. (2005). *Sound-field applications: Applications to speech perception and classroom acoustics* (2nd ed.). New York, NY: Thomson.

Doyle, W. (1979). Making managerial decisions in classrooms. In D. L. Duke (Ed.), *Classroom management* (78th yearbook of the National Society for the Study of Education, Part 2). Chicago, IL: University of Chicago Press.

Fifer, F. (1986). Effective classroom management. *Academic Therapy, 21,* 401–410.

Graham, G. (2016). *Teaching children physical education: Becoming a master teacher* (4th ed.). Champaign, IL: Human Kinetics.

McSporran, E., Butterworth, Y., & Rowson, V. J. (1997). Sound field amplification and listening behavior in the classroom centre for audiology, education of the deaf, and speech pathology. *British Educational Research Journal, 23*(1), 81–96. https://doi.org/10.1080/0141192970230107

Pangrazi, R., & Beighle, A. (2012). *Dynamic physical education for elementary school children* (17th ed.). New York, NY: Pearson.

Rink, J. (2012). *Teaching physical education for learning* (7th ed.). New York, NY: McGraw-Hill.

Ryan, S. (2009). The effects of a sound field amplification system on managerial time in middle school physical education settings. *Journal of Language, Speech, and Hearing Services in Schools, 40,* 131–137. https://doi.org/10.1044/0161-1461(2008/08-0038)

Ryan, S. (2010a). Seven ways to improve sound in physical education settings. *Strategies*, *23*(5), 27–30. https://doi.org/10.1080/08924562.2010.10590891

Ryan, S. (2010b, March 1). *Public address (PA) systems for teaching physical education* [Web newsletter]. Retrieved from http://www.pesoftware.com/Technews/news.html

Ryan, S., & Mendel, L. L. (2010). Acoustics in physical education settings: The learning roadblock. *Physical Education and Sport Pedagogy, 15*(1), 71–83. https://doi.org/10.1080/17408980902729370

Ryan, S., Ormond, T., Imwold, C., & Rotunda, R. J. (2002). The effects of a public address system on the off-task behavior of elementary physical education students. *Journal of Applied Behavior Analysis, 35,* 305–308. https://doi.org/10.1901/jaba.2002.35-305

Ryan, S., Rotunda, R., Song, C., & Maina, M. (2012). The prevalence and impact of voice problems among physical education teachers. *Physical Educator, 69,* 308–322.

Ryan, S., & Yerg, B. (2001). The effects of crossgroup feedback on off-task behavior in a physical education setting. *Journal of Teaching Physical Education, 20,* 172–188. https://doi.org/10.1123/jtpe.20.2.172

Sariscsany, M., Darst, P., & van der Mars, H. (1995). The effects of three teacher supervision patterns on student on-task and skill performance in secondary physical education. *Journal of Teaching in Physical Education, 14*(1), 179–197. https://doi.org/10.1123/jtpe.14.2.179

Siedentop, D., & Tannehill, D. (2001). *Developing teaching skills in physical education* (4th ed.). Mountain View, CA: Mayfield.

van der Mars, H., Cusimano, B. E., & Ruppert, K. (1989). *Teacher movement analysis system: Technical report/software manual.* Tempe: Arizona State University.

van der Mars, H., Darst, P., Volger, B., & Cusimano, B. (1994). Active supervision patterns of physical education teachers and their relationship with student behaviors. *Journal of Teaching in Physical Education, 14,* 99–112. https://doi.org/10.1123/jtpe.14.1.99

Wong, H. (1972). Dear class, I love you. *Learning, 1*(2), 20–22.

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ASSESSMENT

Physical Education Meets Teacher Evaluation: Supporting Physical Educators in Formal Assessment of Student Learning Outcomes

Hans van der Mars, Jeff McNamee, Gay Timken

Abstract

Few physical educators engage in formal assessment of student learning outcomes. Recent trends in high-stakes teacher evaluation make formal assessment of learning progress/outcomes by physical educators a teaching function, central to a "well-rounded education" through recent federal legislation. This project targeted the following research questions: (a) Can physical educators increase their use of formal-formative assessment of student learning outcomes as a consequence of a professional development intervention that includes on-site coaching support? and (b) Can physical educators reliably collect formal-formative assessment data on student learning? Seven (4 females, 3 males; experience range: 4–15 years) licensed secondary school physical education teachers volunteered as participants. The intervention included professional development (PD) workshops, ongoing on-site coaching support, and prompting. A multiple baseline design (MBD) across subjects determined the efficacy of the intervention on teachers' use of formal-formative

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assessment practices. Postcheck follow-up observations were made during the following school year. Data were collected via the validated Systematic Observation of Formal Assessment of Students by Teachers (SOFAST). The reliability of teachers' use of formal assessment was established with a second trained observer simultaneously collecting identical data on the same aspects of student performance as the teacher. Data were plotted graphically across sessions and assessed with standard visual analysis criteria, which demonstrated the functional relationship between the intervention and teachers' use of formal-formative assessment of student outcomes. Standard interobserver agreement calculations determined the reliability of the teachers' assessments of students' MVPA levels versus outside observers' via the total interval method. All seven teachers increased their use of formal assessment of student performance and shifted focus of the assessment toward subject-matter performance. Their formal assessment observations were found to be reliable. Experienced secondary school physical education teachers can successfully and reliably employ formal-formative assessment of student performance outcomes.

Assessment of student learning outcomes is a central teaching function (e.g., NASPE Assessment Task Force, 2008; National Association for Sport and Physical Education [NASPE], 2002; Society of Health and Physical Educators [SHAPE America], 2010a, 2011; Steffen & Grosse, 2003; Stork, 2007) and a standard for beginning and advanced physical educators (SHAPE America, 2010b; National Board for Professional Teaching Standards, 2014). Yet Lund and Veal (2008) noted that school physical education programs lack a culture of assessment. This is problematic in today's climate of high-stakes teacher evaluation practices where teachers' job security is, in part, tied directly to their students' achievement. Despite the demonstrated problem of value-added models (i.e., lack of fairness, reliability and validity; e.g., American Educational Research Association, 2015; American Statistical Association, 2014; Amrein-Beardsley, 2008, 2012; Berliner, 2013, 2014; Lavigne, 2014; Pivovarova, Broatch, & Amrein-Beardsley, 2014), 43 states now require objective measures of student achievement to be included in teacher evaluations, and student growth is the preponderant criterion in teacher evaluations in 16 states (National Council on Teacher Quality, 2015). Moreover, school administrators feel ill-prepared to make use of such teacher

evaluation protocols in physical education contexts (Norris, van der Mars, Kulinna, & Beardsley, 2017).

The recent passing of the Every Student Succeeds Act (ESSA) could impact school physical education in several ways. First, physical education is now seen as a subject central to students' "well-rounded education," and thus (at least in theory) ESSA places it on the same level with other "core" subjects (i.e., Mathematics and English Language Arts). Second, states and school districts are still required to implement teacher and principal evaluation systems that are partially based on evidence of student achievement. Third, at least 20% of Title IV funding associated with ESSA and being distributed by states must fund "safe and healthy" schools, and 20% must go to subjects considered part of a "well-rounded education." Finally, physical education teachers are expected to develop credible evidence of student learning outcomes.

In K–12 education, the focus has shifted from "assessment of learning" to "assessment for learning" (e.g., Black & Wiliam, 1998a; Broadfoot & Black, 2004; Hay, 2006; Wiliam, Lee, Harrison, & Black, 2004). Hay (2006) argued that assessment has two central purposes: (a) assessment for accountability and (b) assessment for learning. Assessment for learning is associated with end-of-unit "summative" assessment and used primarily by teachers to assign final grades. Assessment for learning seeks to inform students (and teachers!) regarding their progress in learning the subject matter throughout a unit of instruction and school year (Black & Wiliam, 1998b). This is analogous to formative assessment and shifts the focus toward how teachers can best support students throughout the learning process (Broadfoot & Black, 2004). Throughout this paper, the terms *learning* and *performance* will be used interchangeably.

Several researchers have called for greater emphasis on formative assessment for learning where teachers collect data throughout the learning process on students' progress (e.g., Baker & Gordon, 2014; Hay, 2006; van der Mars & Harvey, 2010). This shift has come about as a result of an attempt to "align" curriculum, instruction, and assessment (Lund & Tannehill, 2014; Veal, 1992, 1995).

Few physical educators have integrated formal assessment for learning into their day-to-day teaching (Shepard, 2001). Moreover, they have reported that formal assessment of (or for) student

learning is too time consuming and has little value, and/or that they lack the necessary knowledge to perform such assessments (Kneer, 1986). Beyond the typical managerial indicators of attendance, dress, and on-time behavior, physical educators mostly use a mix of student attitude, participation, sportsmanship, and effort as primary performance indicators for grades (e.g., Desrosier, Genet-Volet, & Godbout, 1997; Hensley, Lambert, Baumgartner, & Stillwell, 1987; Imwold, Rider, & Johnson, 1982; Matanin & Tannehill, 1994; Tousignant & Siedentop, 1983). Moreover, physical educators dislike the nature of typical summative (i.e., end-of-unit) assessment (Pryor & Akwesi, 1998).

Greenwood and Maheady (1997) noted that the "inability to document meaningful changes in student performance has impeded our ability as teachers . . . to identify those instructional arrangements and practices that may be responsible for subsequent changes in learner performance" (p. 266). However, simultaneously performing regular instructional duties and assessing student performance throughout units of instruction is a challenging task that might be more within reach through continuing professional development. Continuing professional development that is ongoing and where (experienced) teachers have input and ownership, and work collaboratively with those providing the continuing professional development is key to the effectiveness thereof (e.g., Armour & Yelling, 2007; O'Sullivan & Deglau, 2006; Parker & Patton, 2016).

The use of technology is another performance standard for beginning and advanced physical educators (National Board for Professional Teaching Standards, 2014; SHAPE America, 2010b). However, physical education teachers in the United States and United Kingdom have been slower to adopt and utilize technology than their classroom counterparts (e.g., Thomas & Stratton, 2006; Vahey & Crawford, 2003).

Today's context of teacher evaluation makes it more imperative that physical education programs can (a) clearly articulate their intended outcomes and (b) provide evidence that students are learning something substantive regarding our subject matter, to constituents (including parents, school administrators, policy makers; Rink, 2007). Logically, this places ongoing formal-formative assessment of and for students' learning squarely as a central teaching function for physical education teachers. Therefore, this research

wanted to answer two research questions: (a) Will physical educators increase their use of formative-formal assessment of student learning as a consequence of a yearlong professional development program that included on-site coaching support? and (b) While teaching, can physical educators collect formal-formative assessment data on student learning at an acceptable level of reliability?

Method

Participants and Settings

This research project was approved by a university-based institutional review board. Seven licensed physical educators agreed to serve as participants (4 females, 3 males). Four teachers had developed an extensive record of professional involvement through presentations and participation in state and regional conferences and in professional organizations. Experience with the use of technology in their programs ranged from none to extensive (e.g., program website design). None had employed any handheld digital technology in their teaching. One middle school was located in an affluent suburban bedroom community near a large metropolitan city. A second suburban middle school was located in a suburban middle-class neighborhood. The remaining two middle schools and one high school were located in more rural communities.

In the middle schools, teachers employed a traditional multiactivity curriculum. The three teachers in one middle school program grouped their classes (class size range: 33–45) together in one gym for a common fitness activity. After that, students were free to select between multiple activities at various parts of campus and switch between them daily. The high school teacher employed a combination of Sport Education (Siedentop, Hastie, & van der Mars 2011) and Fitness for Life (Corbin & Lindsey, 2005).

Dependent Variables

The dependent variables included percentage of class time that teachers spent (a) formally and/or informally assessing students' performance and (b) doing other related teaching functions/behaviors (i.e., instructing, managing/organizing, and silently observing students). As well, students' moderate to vigorous physical activity (MVPA) behavior was assessed. Formal assessment was defined as

teachers recording information about student subject-matter performance using either paper and pen or an electronic assessment template on a handheld digital device (PDA) throughout the class period. Informal assessment was defined as the time spent providing (non-)verbal information to students in the form of positive and/or corrective feedback throughout the class period. The focus of the assessment could be on students' content, management, and social behavior.

It is important that data collected by teachers on their students' learning task performance are pertinent and credible (Williams & Rink, 2003). Therefore, data on students' in-class performance that teachers collected while instructing their classes were compared to those of trained outside observers. The students' MVPA level was used as the primary in-class performance indicator. MVPA is a key national health objective for school-age youth (e.g., Institute of Medicine, 2013; Sallis et al., 2012; U.S. Department of Health and Human Services, 2008, 2010, 2012). Students' MVPA levels can be assessed with relative ease at any time throughout the lesson, and this indicator cuts across much of the content taught in physical education (i.e., fitness, sport, rhythms).

Intervention

A combination of three all-day professional development workshops, along with on-site coaching support and prompting, served as the intervention. Teachers were provided with a digital technology tool (i.e., a PDA), which they were allowed to keep at the completion of the project, contingent on continued participation throughout the project.

The first workshop focused on (a) general principles and multiple purposes of assessment, with a specific emphasis on formal assessment conducted throughout units of instruction (Siedentop et al., 2011; van der Mars & Harvey, 2010); (b) formal assessment of physical activity as one student outcome indicator; (c) use of paper-and-pen-based formal assessment; (d) features and use of PDAs; and (e) live practice of paper-and-pen-based formal assessment of student PA levels in real physical education classes.

The second workshop focused on (a) formal assessment of students' skill execution (including overview of how to define "appropriate" and "inappropriate" skill execution), (b) electronic

versions of formal assessment templates, and (c) "live" practice exercises for teachers to formally assess students' PA levels using the PDA during regular physical education classes, and students' skill execution using paper and pen.

The third workshop included (a) reviews of previously discussed topics, overviews, and discussions of the project data to date; (b) formal assessment of more tactical aspects of gameplay (e.g., off-the-ball movement in invasion games, returning to base position in net/court games; Mitchell, Oslin, & Griffin, 2006), and (c) practice of PDA-based formal assessment of gameplay performance using 3- to 4-point gameplay performance scoring guides (Siedentop et al., 2011).

The overarching goal of the workshops was to focus teachers on formally assessing student performance in the psychomotor domain, with the introduction of specific assessment strategies for increasingly more complex indicators of student performance/learning. Initially, teachers learned to track their own students' MVPA levels. Furthermore, maximizing physical activity opportunities for students in physical education is an often-espoused program objective for many teachers. Depending on their interest and readiness, teachers were encouraged to include other targets for assessment, such as students' technique execution (e.g., serve, forehand shot, soccer pass), performance on tactical aspects of gameplay, and aspects of students' fair-play behavior.

The intervention sought to have teachers come to view formal assessment as a more manageable and acceptable teaching function, by emphasizing the "when," "how much," and "who" of assessment (van der Mars & Harvey, 2010). That is, assessment should be ongoing throughout most every lesson. This then allows teachers to make repeated observations over multiple lessons and make adjustments prior assessments of individual students, affords students multiple opportunities to demonstrate what and how well they can perform, and shifts assessment away from the dominant culture of "testing" students. Relative to "how much" to assess, teachers were encouraged to limit the scope of their formal assessment by focusing on one intended outcome in any one class. For example, if returning to base position between every stroke during badminton gameplay was a unit objective, that would be the sole formal assessment focus. In

terms of "who" to observe, teachers were directed to limit the number of students to be assessed per lesson.

On-site coaching support consisted of approximately two visits per 3 school weeks by one of the researchers. In addition, supplemental support was available through telephone- and e-mail-based communications. On-site coaching visits included (a) formal lesson observations, (b) postlesson feedback for teachers on their use of formal assessment (and any other pertinent lesson events), (c) encouragement, (d) discussions on what worked and did not work relative to engaging in formal assessments, (e) the use of PDAs once teachers started employing these, and (f) answering concerns and questions posed by teachers.

Across the seven participating teachers, the initial on-site coaching visits occurred after the first all-day workshop. For individual teachers, the initial coaching visits were staggered throughout the middle part of the school year and signified the start of the intervention phase for the teacher in question.

As part of the intervention, teachers wore a MotivAider (http://habitchange.com/) on their waist belt. The MotivAider provided prompts at set intervals (90 s or 120 s, depending on teachers' preference and level of comfort), reminding them to employ formal assessment. This resulted in teachers being prompted between 20 and 26 times per lesson. Teachers were instructed to ignore prompts that occurred during times where it would be inappropriate or inconvenient (e.g., during a demonstration, instructing an individual student or group of students, or attending to a safety issue).

Research Design

A variation of the multiple baseline design across subjects determined the effects of the intervention on teachers' assessment patterns (Cooper, Heron, & Heward, 2007. Multiple baseline designs have been used widely in educational settings for several decades in applied behavior analysis (ABA) research. Following the repeated measurement of the target behaviors under natural conditions (baseline sessions, noted as A), an intervention (B) is introduced across persons (or behaviors or settings) at varying time intervals and repeated observations of the target behaviors continue. A functional relationship between the intervention and the target behaviors is established if/when (a) the target behavior changes in the desired

direction only upon the implementation of the intervention and (b) the behavior of those who continue in baseline conditions does not change appreciably. In this study, because of scheduling issues (school calendars, etc.), the start of the intervention could not be staggered across each teacher. Postcheck follow-up observations of each teacher were made during the fall of the following school year. This allowed the researchers to determine generalization of the use of formal-formative assessment beyond the professional development program.

In some instances (e.g., first day of a unit of instruction, PDA left at home, PDA battery not charged, a scheduled student choice/free day), teachers announced before class that they would not allocate class time to formally assess student learning. Across all teachers, this occurred in nine of the 88 (10.2%) intervention sessions.

Data Collection

Data on teachers' assessment patterns practices were collected via the validated Systematic Observation of Formal Assessment of Students by Teachers (SOFAST; van der Mars, Timken, & McNamee, 2018). SOFAST is a three-level observation system where observers code (a) teachers' primary teaching functions (i.e., Assessment [formal and informal], Instruction, and Management), (b) the focus of teachers' assessment (i.e., content, management, and social behavior), and (c) the lesson context (i.e., Management, Fitness, Knowledge, Skill Practice, Game, or Other). SOFAST is an interval recording-based observation system using alternating 10-s "observe" and 10-s "record" intervals. A full description of SOFAST can be obtained from the lead author.

Students' in-class MVPA levels were assessed throughout the study, and the researchers determined whether the teachers' formal assessment data reached acceptable reliability levels by comparing teachers' data with independent observers' data. Teachers were asked to make a dichotomous decision when determining students' PA levels, based on the PA level categories of the System for Observing Fitness Instruction Time (SOFIT; McKenzie, Sallis, & Nader, 1991; "No-MVPA" = Lying Down + Sitting + Standing, "Yes-MVPA" = Walking and Very Active; Rowe, van der Mars,

Schuldheisz, & Fox, 2004; Williams & Rink, 2003). Class sessions used for this purpose were separate from those sessions used for determining the effects of the intervention. Teachers and a trained reliability observer collected data on MVPA levels of three randomly selected target students. Target students wore a yellow pinny (numbered 1 to 3), which ensured that both the teacher and the outside observer would observe the same students in the same order.

Both the teachers and the independent reliability observers used momentary time sampling with observation intervals lengths set by the teacher (range 90–120 s). MVPA (non-)occurrence was observed and immediately recorded at the end of each interval. Momentary time sampling is an appropriate and valid means of collecting data across a wide variety of behaviors (including PA), persons, and settings (e.g., Gunter, Venn, Patrick, Miller, & Kelly, 2003; Harrop & Daniels, 1986; McNamee & van der Mars, 2005; Saudargas & Zanolli, 1990; Test & Heward, 1984; van der Mars, 1989a). To ensure that both the teachers and reliability observers would observe and record students' MVPA levels at the same time, the researchers had both wear a MotivAider and synchronize the prompting devices on the outset of each lesson so that both would be prompted at the same time to observe and record the target students' PA levels.

Data Analysis

The researchers used visual analysis of graphically plotted data (the standard analytical approach used in ABA research) to determine the functional relationship between the intervention and the teachers' assessment patterns. They used the following visual analysis criteria: (a) data variability within and across phases, (b) data trends within and across phases, (c) data overlap between phases, and (d) changes in level between phases (Cooper et al., 2007).

For the second research question (i.e., reliability of the physical educators' assessments of students' MVPA levels), the researchers calculated standard interobserver agreement (IOA) percentages using the total interval method (van der Mars, 1989b). The 85% criterion was set as the minimum mean level of IOA percentage for the teachers' observations to be considered sufficiently reliable.

SOFAST Observer Reliability

The researchers established observer reliability for SOFAST observations by conducting at least one IOA check during both the baseline and intervention phase for each teacher, using the total interval method to calculate the IOA percentages. IOA percentages across SOFAST categories were at acceptable levels across all teachers and project phases (see Table 1). Of the 210 IOA percentages, eight (3.8%) were below 80%. All but one occurred during IOA checks conducted during baseline sessions, and these were a consequence of low behavior occurrences. Based on the IOA results, the observers were deemed reliable.

Results

Class Context Data

Class time distribution for SOFAST context categories is presented for all teachers across baseline and intervention phases. The data for each teacher are presented across the five tiers in Figure 1 (from top to bottom). Throughout the intervention, Amanda's classes spent the majority of class time in health-related fitness content (74.4%), as a consequence of Amanda teaching a girls-only Sport Education–based weight training course. Within the finite amount of class time available, this coincided with a significant decrease in the time spent on Skill Practice (-19.6%) and Game activities (18.9%). Beth's classes on average spent less time in Managerial- (–11.5%), Knowledge- (–10.6%), and Skill Practice–related activities (–16.1%) during the intervention, compared to the baseline sessions, but more time in Game-related (or Competition-related) content (21.5%).

Chuck's classes included a significant Fitness component (third tier). The reduced time spent in Management from baseline to intervention (-11.2%), coincided with an increase in time spent on Skill Practice content (14.3%).

Table 1

Total Interval Interobserver Agreement Percentages Across Teachers and Conditions

	Participating teachers													
	1		2		3		4		5		6		7	
Condition	**BL**	**INT**	**BL**	**INT**	**BL**	**INT**	**BL**	**INT**	**BL**	**INT**	**BL**	**INT**	**BL**	**INT**
Teacher functions														
Formal Assessment	87.50	87.50	100.00	100.00	93.75	100.00	91.60	96.30	98.00	80.60	100.00	100.00	97.40	98.10
Informal Assessment	92.30	92.30	88.00	93.40	90.15	95.20	94.50	80.50	90.30	81.50	94.70	83.30	92.90	92.40
Participation/ Demonstration	100.00	100.00	91.00	98.00	95.50	100.00	100.00	100.00	88.90	85.60	50.00	96.60	96.10	95.90
Knowledge	80.00	80.00	68.00	91.50	74.00	100.00	100.00	96.30	96.80	80.50	91.60	86.20	99.00	96.00
Management	90.30	90.30	94.00	99.40	92.15	97.20	98.70	96.60	99.00	98.90	100.00	100.00	100.00	93.20
Silent Observation	94.40	94.40	33.00	91.40	63.70	100.00	90.30	83.90	93.70	80.10	100.00	90.00	92.30	89.10
Teacher Function Average	90.75	90.75	79.00	95.62	84.88	98.73	95.85	92.27	94.45	84.53	89.38	92.68	96.28	94.12
Assessment Focus														
Content	100.00	100.00	86.00	99.20	93.00	97.20	96.30	98.40	90.20	98.20	98.70	90.30	98.40	90.40
Management	100.00	100.00	100.00	100.00	100.00	100.00	95.00	93.80	97.90	100.00	61.80	100.00	90.50	90.70
Social Behavior	50.00	50.00	100.00	100.00	75.00	100.00	100.00	100.00	93.40	92.80	100.00	100.00	100.00	100.00
Assessment Focus Average	83.33	83.33	95.33	99.73	89.33	99.07	97.10	97.40	93.83	97.00	86.83	96.77	96.30	93.70
Class Context														
Management	90.20	90.20	94.00	96.20	92.10	95.40	97.60	99.20	94.00	92.40	86.30	66.00	98.10	87.50
Knowledge	100.00	100.00	94.00	100.00	97.00	75.00	94.90	100.00	90.60	83.90	90.50	100.00	93.90	100.00
Fitness	100.00	100.00	100.00	100.00	100.00	100.00	100.00	83.80	100.00	100.00	100.00	100.00	95.50	92.70
Skill Practice	97.80	97.80	96.00	100.00	96.90	100.00	98.90	100.00	98.90	100.00	100.00	100.00	100.00	100.00
Game	96.60	96.60	100.00	94.00	98.30	96.10	92.90	99.80	92.90	93.40	100.00	100.00	94.50	92.10
Other	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	98.00	100.00	100.00	100.00	93.90	100.00
Class Context Average	97.43	97.43	97.33	98.37	97.38	94.42	97.38	97.13	95.73	94.95	96.13	94.33	95.98	95.38

Note. BL = Baseline IOA; INT = Intervention IOA.

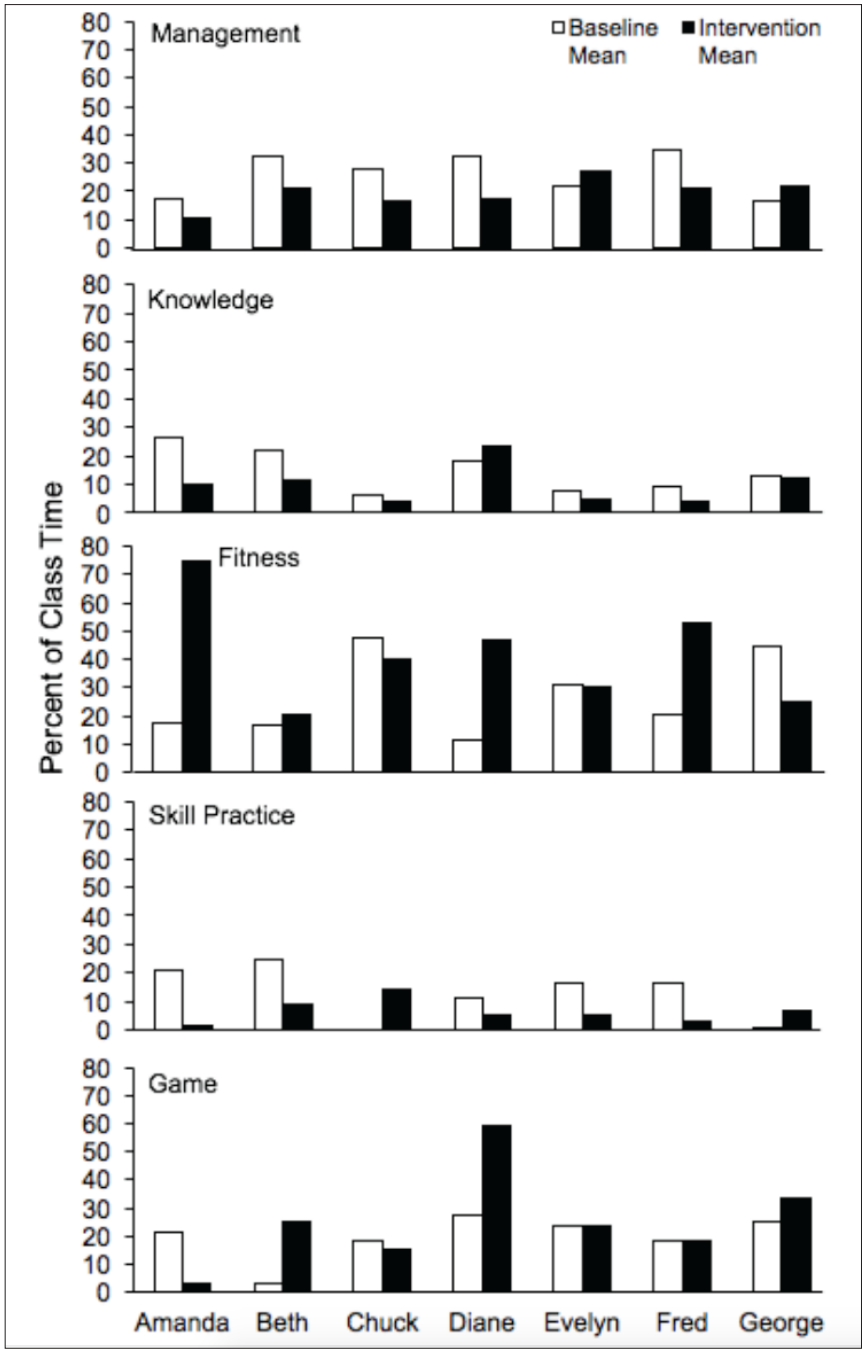

Figure 1. Mean percentage of class time during baseline and intervention across SOFAST class context categories.

Students in Diane's classes spent less time in Managerial tasks (−14.8%) and Game content (−22%) on average during intervention, compared to baseline sessions. This is related to the significant increase in fitness content (35.4%). Changes from baseline to intervention were less pronounced for students in Evelyn's classes, other than a slight increase in Management time (4.8%) and reduced time spent in Skill Practice (−11%). Students in Fred's program also experienced a significant increase (31.8%) in time spent on Fitness from baseline to intervention. This coincided with lower percentages for Management (−13.8%) and Skill Practice (−13.5%). Finally, students in George's classes experienced reduced class time in Fitness content (−19.5%) and increases in Managerial tasks (5.1%), Skill Practice (6.4%), and Game content (8.3%).

Teaching Functions Data

Figure 2 summarizes the data across the five teaching functions across baseline and intervention. On average, the class time spent engaged in Managerial activities during intervention, compared to baseline, was lower for Beth (−6.4%), Chuck (−9.5%), Diane (−20.9%), Evelyn (−7.0%), and Fred (−15.9%). Amanda's engagement in Managerial activities remained unchanged, while George increased his involvement by 5.8%.

As a group, teachers spent little time demonstrating/participating with students in physical activity during baseline. Most teachers (with the exception of Diane and George), lowered their demonstration/participation levels even further during intervention. Beth, Chuck, Evelyn, Fred, and George reduced the amount of time they spent instructing their students (i.e., content-related explanation and skill prompts) from baseline to intervention by 4.4%, 4.1%, 5.6%, 7.7%, and 7.5%, respectively. On average, silent observation of students by Chuck, Evelyn, and Fred increased during Intervention by 4.7%, 10.4%, and 3.7%, respectively.

Already low during baseline, silent observation decreased with Amanda and Beth (−5.6% and −2.4%, respectively). Finally, as a group, teachers spent a significant amount of their time assessing students' performance during baseline. This included the time spent in formal assessment. During intervention, except for George, all teachers increased their time on assessment between 7.1% and 23.2%.

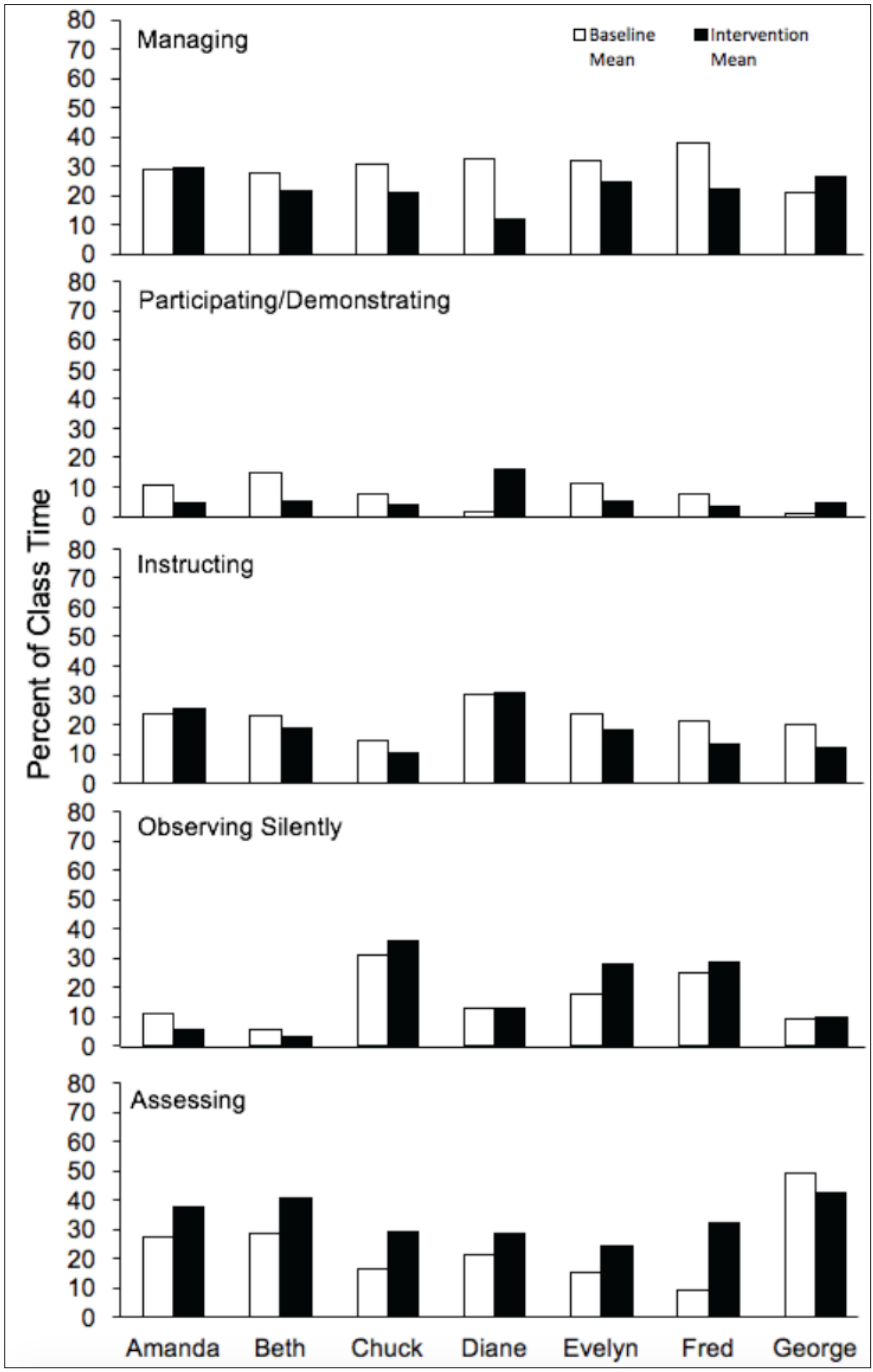

Figure 2. Mean percentage of class time during baseline and intervention across SOFAST teaching function categories.

Intervention Data

Figures 3 and 4 include data on the percentage of class time that each teacher allocated for formal-formative assessment. The start of the intervention for each participant is signified by the furthest left continuous vertical dashed line. On select days, teachers indicated they would not formally assess student performance for specific reasons, and these days are labeled with an asterisk above the session's data point. The furthest right vertical dashed line reflects the start of postcheck sessions across teachers.

During baseline (A), time spent on formal assessment of any kind was minimal across all teachers. The formal assessment that occured targeted Managerial aspects of students' performance (i.e., attendance, dress, on-time behavior) and was largely stable across teachers, with minimal variability and phase means ranging from .9% to 5% across teachers.

Immediate and appreciable increases occurred upon intervention (B). With the exception of the sessions marked with an asterisk, data overlap between baseline and intervention phases was minimal across all teachers.

Table 2 includes phase means and standard deviations for baseline, intervention, and postcheck sessions (intervention means and standard deviations include the sessions marked with an asterisk). It also includes data on the change in level from the final baseline session to the first intervention session. The change-in-level percentage ranged from a low of 8.1% (Evelyn) to a high of 27% (George).

Postcheck observations were made during the subsequent fall, and the researchers used them to determine whether teachers would sustain their use of formal-formative assessment of substantive student outcomes beyond the intervention. Figures 3 and 4 show encouraging results in that Beth, Diane, Evelyn, Fred, and George in at least some of the postcheck sessions engaged in formal assessment of student learning at levels that were at or above initial baseline levels.

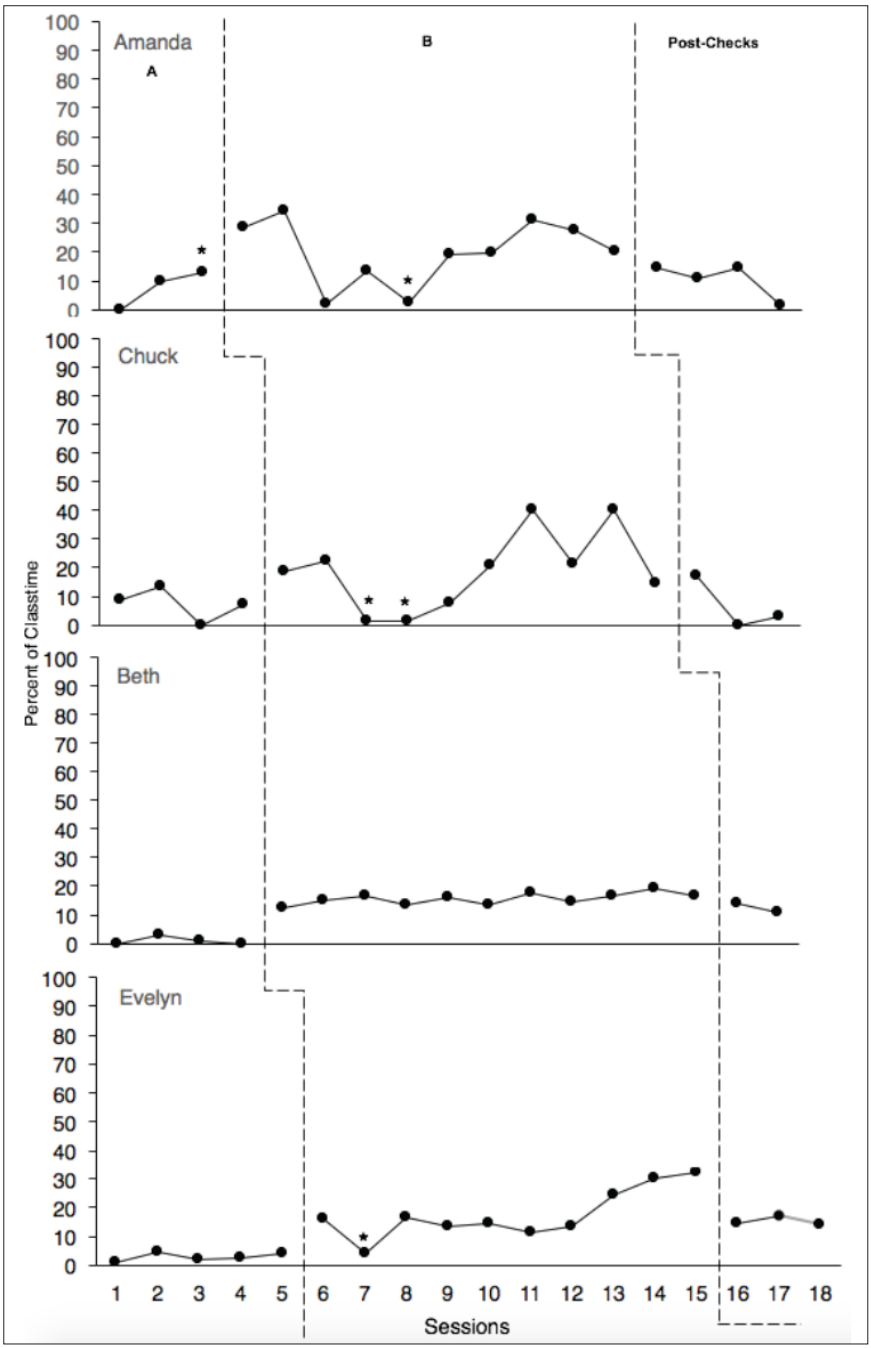

Figure 3. Mean percentage of class time spent on formative-formal assessment across conditions.

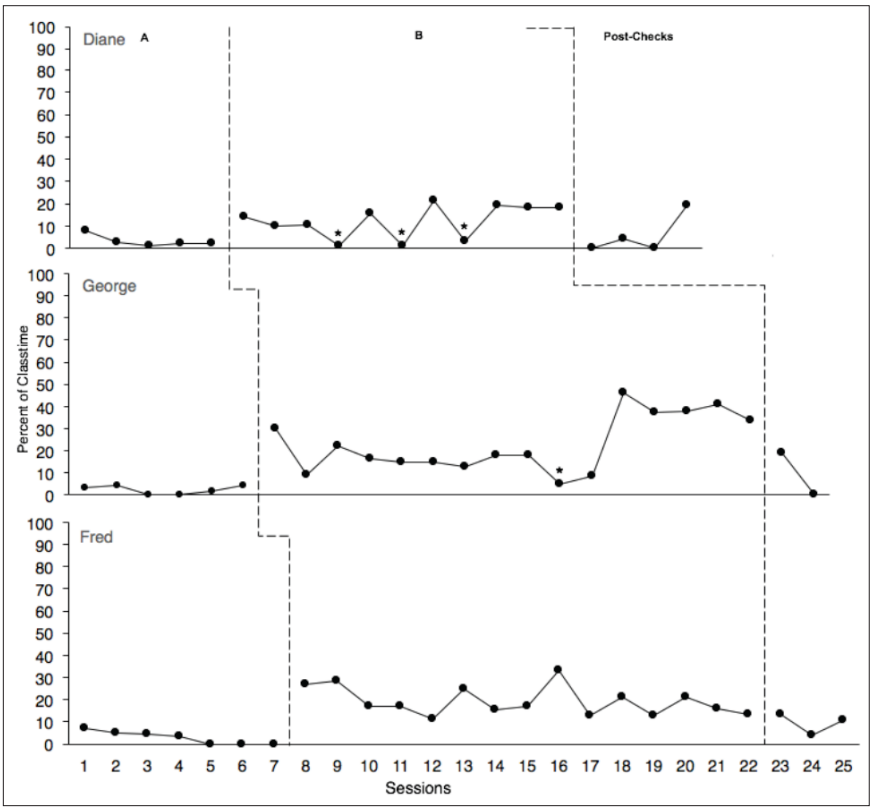

Figure 4. Mean percentage of class time spent on formative-formal assessment across conditions.

Table 2

Mean Percentage of Class Time Spent in Formative-Formal Assessment Across Phases

	Baseline		Change	Intervention		Postcheck	
Teacher	*M*	(*SD*)	in level[a]	*M*	(*SD*)	*M*	(*SD*)
Amanda	5.5	(5.6)	15.2	19.4	(10.7)	8.9	(8.6)
Beth	0.9	(1.3)	12.5	15.5	(2.4)	15.5	(2.7)
Chuck	5.7	(5.3)	9.4	18.8	(13.7)	6.7	(9.3)
Diane	3.0	(1.5)	12.0	19.1	(7.8)	15.3	(1.7)
Evelyn	2.7	(2.3)	8.1	12.1	(7.5)	5.9	(9.1)
Fred	2.8	(2.1)	25.3	22.9	(13.5)	9.6	(13.5)
George	2.8	(2.8)	27.0	19.3	(6.6)	9.2	(4.7)

[a]Difference between first intervention session and final baseline session.

Assessment Focus

Figure 5 presents the shift in teachers' formal-formative assessment focus between Content, Management, or Social behavior task performance. During baseline, teachers, except for Amanda and Chuck, focused exclusively on students' performance on Management-related expectations (i.e., attendance, dress, being on time), as shown in the white bars. Upon the start of the intervention, all teachers shifted their formative-formal assessment to students' performance on Content learning tasks. Furthermore, they maintained this emphasis during postcheck sessions.

During intervention, several teachers voiced interest in increasing their efforts in formally assessing students' overall class conduct (i.e., personal and social behavior), as they viewed this area as key in terms of what their program sought to accomplish. Although teachers may have kept records on this outside of class, as can be seen in Figure 2, during the 88 intervention sessions across all participating teachers, none included any within-lesson formal assessment of students' general class conduct.

Reliability of Teachers' Observations of Student Performance

The teachers' reliability in observing their students' MVPA was checked between six and eight times throughout the project's intervention phase. When a teacher used his or her PDA approach for recording student data, the outside observer would also use a PDA. If the teacher used a paper-and-pencil approach, then the outside observer used the same approach for data collection. Figure 6 includes the IOA data, including the mean, standard deviation, and range of IOA percentages. Four of the teachers used their PDA during the IOA sessions. Their mean IOA percentages ranged from 88.6% (Diane) to 96% (Beth). Except for Fred, whose data had the largest variability, all teachers met the 85% IOA criterion set prior to the study, with Fred's data having the largest variability.

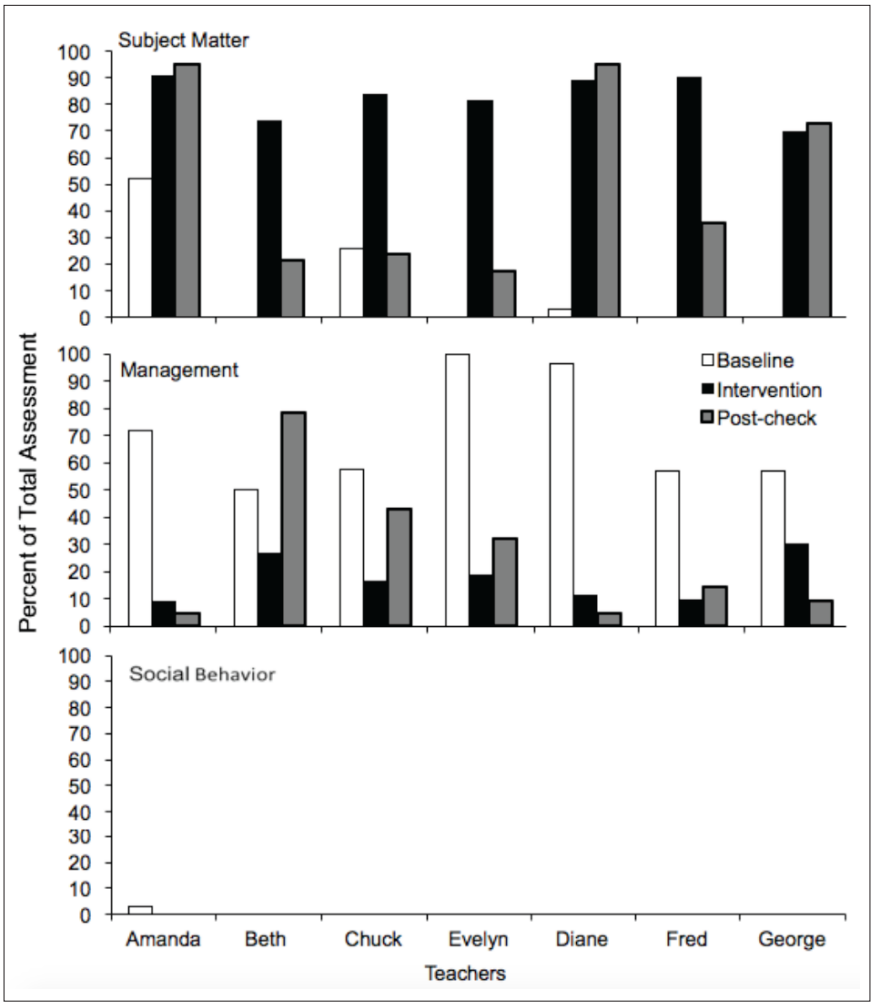

Figure 5. Mean percentage of formal-formative assessment of students' management, subject matter, and social behavior performance across conditions.

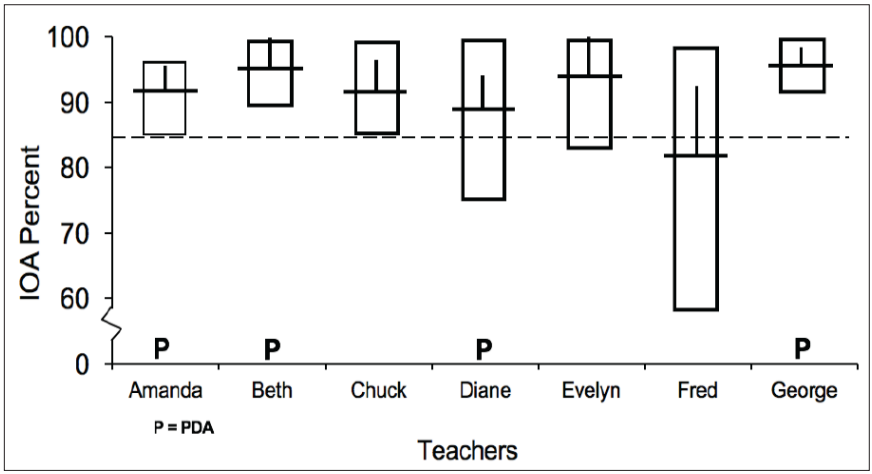

Figure 6. Mean interobserver agreement percentages (with *SD* and ranges) across teachers.

Discussion

Professional Development Intervention

The combination of professional development workshops, on-site coaching, and prompting enabled teachers to increase teachers' formal-formative assessment of substantive student performance. The changes in the assessment patterns and focus did not occur until the start of the intervention, were immediate and substantial, and were sustained throughout the intervention, as well as during post-checks. This reflects a functional relationship of the intervention with the teachers' assessment practices.

Although no formal analysis was made of which specific intervention component (workshops, on-site coaching, and prompting) was the more critical component, the workshops and the on-site coaching components were interdependent in the sense that without the workshops, the on-site coaching would have lacked context. Similarly, if the workshops had been the sole intervention without opportunities to practice the skills associated, progress might have been more difficult. The workshops offered teachers important background on the role and importance of assessment in teaching physical education and how assessment has multiple functions

beyond determining grades. Workshops also afforded teachers the opportunity to learn about and discuss with colleagues/peers concepts and issues related to assessment, the importance of which was documented by Armour and Yelling (2007).

Early on during the intervention, teachers tracked students' MVPA levels (three per lesson). This performance indicator was chosen because of the relative ease with which it can be assessed. It also allowed teachers to become more comfortable engaging in ongoing formal-formative assessment as a daily teaching function. While possibly viewed as a narrow indicator of student learning outcomes, student MVPA reflects a focus on national health objectives (e.g., Institute of Medicine, 2013; Sallis et al., 2012; U.S. Department of Health and Human Services, 2010), as well as a program outcome, oftentimes espoused by physical educators themselves.

Choice, ownership, and teacher-centeredness during professional development efforts are deemed cornerstones of effective professional development (e.g., Armour & Yelling, 2007; O'Sullivan & Deglau, 2006; Parker & Patton, 2016). From that perspective, the decision of what to assess was left to the teachers after the initial workshop. The researchers merely offered suggestions and support when asked (e.g., through provision of assessment tools). As the intervention phase unfolded, teachers were introduced to a variety of standards-based assessment templates that (a) covered a wider range of student outcome indicators and (b) allowed for true authentic assessment (i.e., assessment of student performance in conditions that reflect real-world settings). Four of the teachers broadened the scope of what they chose to assess by focusing on student learning indicators such as skill execution, gameplay performance from a tactical perspective, and fair play behavior. This is a desirable developmental step in the process of making assessment more of a habit than a nuisance.

Comments (as well as actions) from most teachers during postlesson discussions reflect that they came to view assessment as distinctly broader than the assigning of grades, and point to an increased interest in assessment for learning (Hay, 2006). An example of evidence for this occurred toward the end of the intervention when George's recording of a student's performance became a trigger to provide his students with either technique- or tactics-focused

prompts or feedback. While the combined use of formal and informal assessment did not become a prevalent pattern among all teachers, it does suggest that physical educators, with practice, can indeed weave formal assessment of student performance throughout during their instruction. This supports Desrosiers et al.'s (1997) argument that authentic assessment should be integrated within the teaching–learning process, be shared with the students, and have a formative focus.

Balancing the central teaching functions of instruction, management, and monitoring of students (Siedentop & Tannehill, 2000) is a complex endeavor that teachers engage in every day and every lesson. Given this context, making formal-formative assessment a more habitual/daily function was assumed to be a difficult process, as teachers have reported that formal assessment of student learning is too time consuming and lacks relevance (Hay, 2006; Kneer, 1986). Interestingly, physical educators spend a significant amount of class time silently observing students (i.e., 20–35% of total class time; Siedentop & Tannehill, 2000). However, to date, little is known about what teachers look for, what they think about, and/or what they plan for when silently observing the environment and students. Logically, then, at least part of this time spent in silent observation might lend itself to more focused and deliberate observations and subsequent recording of data on student performance.

As Figure 2 shows, each teacher took a slightly different approach to shifting the balance across the various teaching functions, to create time for themselves to formally assess their students. For example, most teachers spent less time in managerial tasks during intervention than during baseline. Surprisingly, the three teachers with the highest percentage of class time spent silently observing students during baseline spent even more time on this during the intervention. Yet even they managed to build in class time for the assessment function.

As part of the intervention, teachers were introduced to employing a digital handheld device to record student performance data. Compared to their classroom counterparts, physical educators have been found to be more resistant to employing (or at least slower to employ) technology in their teaching (e.g., Thomas & Stratton, 2006; Vahey & Crawford, 2003). The transition to using a PDA

differed for the participating teachers. Amanda, Beth, Diane, and George became consistent users of a PDA. For the others, employing formal-formative assessment via paper and pencil was sufficiently overwhelming, and using the PDA likely made the practice of formal assessment more difficult. Consequently, their PDA use was more intermittent. This pattern was similar to findings reported previously (e.g., Thomas & Stratton, 2006; Vahey & Crawford, 2003).

The intervention was successful for at least three reasons. First, throughout the workshops and on-site coaching, the researchers framed the process of formal assessment as ongoing, limited in scope, and focused on only a few students per lesson, and then offered teachers opportunities to practice the techniques associated with this type of formal-formative assessment. This may have helped the participating teachers view the assessment function as more manageable, and perhaps more acceptable.

Second, the structure of the professional development intervention went well beyond merely introducing a set of general principles of assessment and letting teachers figure out for themselves how to translate these into practice (Black & Wiliam, 1998b). It included opportunities to practice and on-site coaching support. Furthermore, during the workshops, teachers shared positive and negative experiences in designing and using their own assessment tools. Such active engagement is regarded a key component of quality professional development for teachers (e.g., O'Sullivan & Deglau, 2006; Parker & Patton, 2016), and it helped create a sense of partnership among teachers and with project leaders.

The contribution of the periodic prompts (coming between 90 s and 120 s) throughout the lessons cannot be underestimated. Prompts are a critical tool in the early stages of learning most every new skill (Cooper et al., 2007). The MotivAider kept the teachers focused on practicing a skill that is essentially new, relative to other more established teaching skills. It likely also contributed to the relatively stable trends and limited variability in the intervention phase data across all teachers (other than the sessions marked with an asterisk), which points to the effectiveness of this specific intervention component. During informal postlesson discussions, several teachers noted that with some practice and experience, the process of formal-formative assessment became easier. For example, George

noted that during gameplay portions of his badminton unit, he managed to assess as many as 14 students on their return to base position following each stroke. By the end of the intervention phase, George had phased out the use of the prompting device, yet maintained a steady level of formal assessment.

Reliability of Teachers' Observations of Student Performance

The complex task of orchestrating teaching functions of instruction, management, and assessment warranted an assessment of whether teachers would be reliable in their formal assessment of students' MVPA. Across all the teachers, just over 2,500 on-the-spot assessment decisions were made during the IOA sessions. Of those the assessments the teachers made, well over 2,100 instances matched those of the outside reliability observers. Six of the seven teachers met the preset 85% IOA criterion. These percentages are in line with those reported by Williams and Rink (2003). These levels of agreement are more than acceptable and offer confidence that teachers, with proper training and support, can reliably assess students' physical activity behavior on the fly. Furthermore, physical activity behavior can vary in duration and has a clear start and end. Thus, if the momentary sampling of the two observers is off by as little as 1 s (which is not unlikely), teachers might differ in their judgment of whether the student was engaged in MVPA.

The strengths of this study include (a) the efficacy of longer term (yearlong) professional development support to demonstrate that secondary physical educators are more than capable of employing formal-formative assessment throughout their lessons, (b) the shift in teachers' assessment from being focused primarily on students' managerial performance to subject matter–specific performance, and (c) the sustained level of such assessment beyond the intervention phase. Moreover, the professional development–focused intervention employed in this study is likely a key to building a culture where ongoing formal-formative assessment of student performance becomes an accepted part of physical education teaching practices.

This study was not without limitations. First, it lacked formal reliability checks on teachers' assessment of the more complex student performance indicators (e.g., tactical performance in gameplay).

All participating teachers were introduced to several three-level scoring rubrics that included gameplay performance indicators (e.g., Volleyball, Pickleball, and Basketball). However, the amount of workshop time available (approximately 24 hr spread over 3 days) allowed only for the introduction to the assessment templates and limited video-based and live observation practice opportunities. All seven teachers were encouraged to "try them out" in their own settings, but only four did so. For each activity, the assessment scoring guides included several performance indicators (e.g., court coverage, guarding/marking) from which teachers could choose. Each indicator included descriptors of observable gameplay behaviors at three performance levels (progressing, meets, exceeds). Compared to traditional, de-contextualized skills tests, these scoring guides reflect more authentic process indicators of progress and learning. While no IOA check were conducted, we believe that if teachers have the needed content knowledge and target specific student outcomes, they can, with practice, become skillful in assessing such outcomes.

Second, the small sample prevents generalization to all middle school physical educators. However, future systematic replications can add to this study's evidence. Third, even though there is now evidence that teachers can effectively and reliably assess students' substantive outcomes, and that they can sustain this beyond the intervention phase, there is no guarantee that they will in all cases. Physical education's policy landscape is potentially changing for the better (e.g., ESSA) with improved support for physical education, which is now regarded essential to students being well educated. However, until explicit program outcome expectations are in place at the state level, along with expectations for formal assessment of such outcomes by physical educators, it is more likely that the formal assessment strategies targeted in this study will occur largely because of the level of professionalism by individual teachers.

A final limitation is the constraints put on the researchers in scheduling the start and end of the intervention phase. For a multiple baseline design, the goal is to vary the lag time of the start for each teacher. Because of school schedules, the lag times were limited in a number of cases. However, this was offset by the immediate and substantial changes in assessment patterns across teachers.

Practical Implications

School physical education programs currently enjoy substantial support from outside the field (e.g., Centers for Disease Control and Prevention, 1997, 2001; Pate et al., 2006) in terms of their role in reversing the overweight/obesity trends among children and youth. This is evidenced by the emergence of national guidelines and recommendations and the advances in policy development and legislative efforts (e.g., ESSA) specific to physical education. Physical education cannot afford to claim its benefits and importance without being able to provide credible evidence of what it accomplishes. School physical education programs are part of a (publicly) funded school system. Thus, they bear the responsibility to demonstrate that continuing this investment is justified (Rink, 2007).

While the ultimate impact of such policy and legislative efforts are yet unknown, there is evidence that physical education programs are ill-prepared to present evidence that they have appreciable impact. For a functional culture of assessment to emerge in physical education, preservice PETE programs and professional development programs for already certified teachers must increase efforts in equipping current and future teachers with the skills, knowledge, and dispositions necessary to make assessment of student learning a teaching function that is viewed as a normal part of daily work.

The central message from this study is that formal-formative assessment of students' subject-matter performance is within reach for physical educators. The results also reinforce the need for professional development to be ongoing and long term. It should also allow for ample practice in developing the desired formal-formative assessment of learning skills and for active involvement by participating teachers in shaping specific features of such efforts (Armour & Yelling, 2007). Furthermore, these results are more likely to occur if a clear context is provided on the need and multiple purposes of assessment and on the link between assessment and instructional goals.

Conclusion

Focused and ongoing professional development that includes on-site coaching helps experienced secondary physical education teachers to (a) infuse formal-formative assessment of student in-class

performance as a primary teaching function and (b) shift the focus of such assessment efforts toward substantive learning outcomes.

References

American Educational Research Association. (2015). AERA statement on use of value-added models (VAM) for the evaluation of educators and educator preparation programs. *Educational Researcher, 44,* 448–452. https://doi.org/10.3102/0013189X15618385

American Statistical Association. (2014). *ASA statement on using value-added models for educational assessment*. Retrieved from http://www.amstat.org/policy/pdfs/ASA_VAM_Statement.pdf

Amrein-Beardsley, A. (2008). Methodological concerns about the Education Value-Added Assessment System (EVAAS). *Educational Researcher, 37*(2), 65–75. https://doi.org/10.3102/0013189X08316420

Amrein-Beardsley, A. (2012). Value-added measures in education: The best of the alternatives is simply not good enough. *Teachers College Record, 114*. Retrieved from https://www.tcrecord.org/

Armour, K. M., & Yelling, M. (2007). Effective professional development for physical education teachers: The role of informal, collaborative learning. *Journal of Teaching in Physical Education, 26*, 177–200. https://doi.org/10.1123/jtpe.26.2.177

Baker, E. L., & Gordon, E. W. (2014). From the assessment of education to the assessment for education: Policy and futures. *Teachers College Record, 116,* 1–24.

Berliner, D. C. (2013). Problems with value-added evaluations of teachers? Let me count the ways! *Teacher Educator, 48*, 235–243. https://doi.org/10.1080/08878730.2013.827496

Berliner, D. C. (2014). Exogenous variables and value-added assessments: A fatal flaw. *Teachers College Record, 116,* 1–31. Retrieved from http://www.tcrecord.org/Content.asp?ContentId=17293

Black, P., & Wiliam, D. (1998a). Assessment and classroom learning. *Assessment in Education, 5*, 7–74. https://doi.org/10.1080/0969595980050102

Black, P., & Wiliam, D. (1998b). Inside the black box: Raising standards through classroom assessment. *Phi Delta Kappan, 80,* 139–144.

Broadfoot, P., & Black, P. (2004). Redefining assessment: The first ten years of 'Assessment in Education.' *Assessment in Education, 11,* 7–27. https://doi.org/10.1080/0969594042000208976

Centers for Disease Control and Prevention. (1997). Guidelines for school and community programs to promote lifelong physical activity among young people. *Morbidity and Mortality Weekly Report, 46*(RR-6), 1–37.

Centers for Disease Control and Prevention. (2001). Increasing physical activity: A report on recommendations of the Task Force on Community Preventive Services. *Morbidity and Mortality Weekly Report, 50*(RR18), 1–16.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied behavior analysis* (2nd ed.). Columbus, OH: Merrill.

Corbin, C. B., & Lindsey, R. (2005). *Fitness for life* (5th ed.). Champaign, IL: Human Kinetics.

Desrosiers, P., Genet-Volet, Y., & Godbout, P. (1997). Teachers' assessment practices viewed through the instruments used in physical education classes. *Journal of Teaching in Physical Education*, *16*, 211–228. https://doi.org/10.1123/jtpe.16.2.211

Doolittle, S. (1996). Practical assessment for physical education teachers. *Journal of Physical Education, Recreation, and Dance, 67*(8), 35–38. https://doi.org/10.1080/07303084.1996.10604835

Greenwood, C. R., & Maheady, L. (1997). Measurable change in student performance: Forgotten standard in teacher preparation. *Teacher Education and Special Education, 20,* 265–275. https://doi.org/10.1177/088840649702000307

Gunter, P. L., Venn, M. L., Patrick, J., Miller, K. A., & Kelly, L. (2003). Efficacy of using momentary time samples to determine on-task behavior of students with emotional/behavioral disorders. *Education and Treatment of Children, 26*, 400–412.

Harrop, A., & Daniels, M. (1986). Methods of time sampling: A reappraisal of momentary time sampling and partial interval recording. *Journal of Applied Behavior Analysis, 19,* 73–77. https://doi.org/10.1901/jaba.1986.19-73

Hay, P. J. (2006). Assessment for learning in physical education. In D. Kirk, D. Macdonald, M. M. O'Sullivan (Eds.), *Handbook of physical education* (pp. 312–325). London, England: Sage. https://doi.org/10.4135/9781848608009.n18

Hensley, L., Lambert, L., Baumgartner, T., & Stillwell, T. (1987). Is evaluation worth the effort? *Journal of Physical Education, Recreation, and Dance, 58*(6), 59–62. https://doi.org/10.1080/07303084.1987.10609577

Imwold, C. H., Rider, R. A., & Johnson, D. J. (1982). The use of evaluations in public school physical education programs. *Journal of Teaching in Physical Education, 2,* 13–18. https://doi.org/10.1123/jtpe.2.1.13

Institute of Medicine. (2013). *Educating the student body: Taking physical activity and physical education to school*. Washington, DC: National Academies Press.

Kneer, M. (1986). A description of physical education instructional theory/practice gap in selected secondary schools. *Journal of Teaching in Physical Education, 5,* 91–106. https://doi.org/10.1123/jtpe.5.2.91

Lavigne, A. L. (2014). Exploring the intended and unintended consequences of high-stakes teacher evaluation on schools, teachers, and students. *Teachers College Record, 116*. Retrieved from http://www.tcrecord.org/content.asp?contentid=17294

Lund, J. (1992). Assessment and accountability in secondary physical education. *Quest, 44,* 352–360. https://doi.org/10.1080/00336297.1992.10484061

Lund, J., & Tannehill, D. (Eds.). (2014). *Standards-based curriculum development* (3rd ed.). Sudbury, MA: Jones and Bartlett.

Lund, J., & Veal, M. L. (2008). Measuring pupil learning—How do student teachers assess within instructional models? *Journal of Teaching in Physical Education, 27,* 487–511. https://doi.org/10.1123/jtpe.27.4.487

Matanin, W. C., & Tannehill, D. (1994). Assessment and grading in physical education. *Journal of Teaching in Physical Education, 13,* 395–405. https://doi.org/10.1123/jtpe.13.4.395

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

McNamee, J., & van der Mars, H. (2005). Accuracy of momentary time sampling: A comparison of varying interval lengths using SOFIT. *Journal of Teaching in Physical Education, 24*, 282–292. https://doi.org/10.1123/jtpe.24.3.282

Mitchell, S. A., Oslin, J. L., & Griffin, L. L. (2013). *Teaching sport concepts and skills: A tactical games approach for ages 7 to 18* (3rd ed.). Champaign, IL: Human Kinetics.

NASPE Assessment Task Force. (2008). *PE Metrics: Assessing the standards, Standard 1 Elementary*. Reston, VA: Author.

National Association for Sport and Physical Education. (2002). *Authentic assessment of physical activity for H.S. students*. Reston, VA: Author.

National Association for Sport and Physical Education. (2010). *National standards and guidelines for physical education teacher education* (3rd ed.). Reston, VA: Author.

National Board for Professional Teaching Standards. (2014). *Physical education standards for teachers of students ages 3–18+* (2nd ed.). Retrieved from http://boardcertifiedteachers.org/sites/default/files/ECYA-PE.pdf

National Council on Teacher Quality. (2015). *2015 state teacher policy yearbook: National summary*. Retrieved from http://www.nctq.org/dmsView/2015_State_Teacher_Policy_Yearbook_National_Summary_NCTQ_Report

National Physical Activity Plan Alliance. (2016). *National physical activity plan*. Retrieved from http://physicalactivityplan.org/docs/2016NPAP_Finalforwebsite.pdf

Norris, J., van der Mars, H., Kulinna, P., & Beardsley, A. (2017). Administrators' perceptions of physical education teacher evaluation. *Physical Educator, 74*, 730–756. https://doi.org/10.18666/TPE-2017-V74-I4-7468

O'Sullivan, M., & Deglau, D. (2006). Chapter 7: Principles of professional development. *Journal of Teaching in Physical Education, 25*, 441–449. https://doi.org/10.1123/jtpe.25.4.441

Parker, M., & Patton, K. (2016). What research tells us about continuing professional development for physical education teachers. In C. Ennis (Ed.), *Routledge handbook of physical education pedagogies* (pp. 447–460). New York, NY: Routledge.

Pate, R. R., Davis, M. G., Robinson, T. N., Stone, E. J., McKenzie, T. L., & Young, J. C. (2006). Promoting physical activity in children and youth: A leadership role for schools. *Circulation, 114,* 1214–1224. https://doi.org/10.1161/CIRCULATIONAHA.106.177052

Pivovarova, M., Broatch, J., & Amrein-Beardsley, A. (2014). Chetty, et al. on the American Statistical Association's recent position statement on value-added models (VAMs): Five points of contention. *Teachers College Record, 2014.* Retrieved from http://www.tcrecord.org/Content.asp?ContentId=17633

Pryor, J., & Akwesi, C. (1998). Assessment in Ghana and England: Putting reform to the test of practice. *Compare, 28*, 263–275. https://doi.org/10.1080/0305792980280304

Rink, J. (2007). PE teaching: It's ALL about outcomes [Editorial]. *PELinks4u, 9*(7). Retrieved from http://www.pelinks4u.org/archives/070107.htm

Rowe, P., van der Mars, H., Schuldheisz, J., & Fox, S. (2004). Measuring physical activity in physical education: Validating SOFIT for use with high school students. *Journal of Teaching in Physical Education, 23*, 235–251. https://doi.org/10.1123/jtpe.23.3.235

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 and Sport, 83*, 125–135. https://doi.org/10.1080/02701367.2012.10599842

Saudargas, R. A., & Zanolli, K. (1990). Momentary time sampling as an estimate of percentage time: A field validation. *Journal of Applied Behavior Analysis, 23,* 533–537. https://doi.org/10.1901/jaba.1990.23-533

Shepard, L. A. (2001). The role of classroom assessment in teaching and learning. In V. Richardson (Ed.), *Handbook of research on teaching* (pp. 1066–1101). Washington, DC: American Educational Research Association.

Siedentop, D., Hastie, P. A., & van der Mars, H. (2011). *Complete guide to Sport Education* (2nd ed.). Champaign, IL: Human Kinetics.

Siedentop, D., & Tannehill, D. (2000). *Developing teaching skills in physical education* (4th ed.). Mountain View, CA: Mayfield.

Society of Health and Physical Educators. (2010a). *PE metrics: Assessing national standards 1-6 in elementary school* (2nd ed.). Champaign, IL: Human Kinetics.

Society of Health and Physical Educators. (2010b). *National standards and guidelines for physical education teacher education* (3rd ed.). Champaign, IL: Human Kinetics.

Society of Health and Physical Educators. (2011). *PE metrics: Assessing national standards 1–6 in secondary school.* Champaign, IL: Human Kinetics.

Society of Health and Physical Educators. (2014). *National standards and grade-level outcomes for K–12 physical education*. Champaign, IL: Human Kinetics.

Society of Health and Physical Educators. (2015a). *Updated standard 1 assessments for PE metrics ebook: Assessing standards 1–6 in elementary school*. Champaign, IL: Human Kinetics.

Society of Health and Physical Educators. (2015b). *Updated standard 1 assessments for PE metrics ebook: Assessing standards 1–6 in secondary school.* Champaign, IL: Human Kinetics.

Steffen, J., & Grosse, S. J. (2003). *Assessment in outdoor adventure physical education*. Reston, VA: National Association for Sport and Physical Education.

Stork, S. (2007). *Assessing gymnastics in elementary physical education*. Reston VA: National Association for Sport and Physical Education.

Test, D., & Heward, W. L. (1984). Accuracy of momentary time sampling: A comparison of fixed and variable-interval observation schedules. In W. L. Heward, T. Heron, D. Hill, & J. Trap-Porter (Eds.), *Focus on behavior analysis in education* (pp. 177–196). Columbus, OH: Merrill.

Thomas, A., & Stratton, G. (2006). What we are really doing with ICT in physical education: A national audit of equipment, use, teacher attitudes, support, and training. *British Journal of Educational Technology, 37,* 617–632. https://doi.org/10.1111/j.1467-8535.2006.00520.x

Tousignant, M., & Siedentop, D. (1983). A qualitative analysis of task structures in required secondary physical education classes. *Journal of Teaching in Physical Education, 3*, 47–57. https://doi.org/10.1123/jtpe.3.1.47

U.S. Department of Health and Human Services. (2008). *2008 physical activity guidelines for Americans.* Retrieved from http://health.gov/paguidelines/pdf/paguide.pdf

U.S. Department of Health and Human Services. (2010). Physical activity. Retrieved from https://www.healthypeople.gov/2020/topics-objectives/topic/physical-activity

U.S. Department of Health and Human Services. (2012). *Physical activity guidelines for Americans midcourse report*: *Strategies to increase physical activity among youth.* Retrieved from http://health.gov/paguidelines/midcourse/pag-mid-course-report-final.pdf

Vahey, P., & Crawford, V. (2003). *Learning with handhelds: Findings from classroom research.* Menlo Park, CA: SRI International.

van der Mars, H. (1989a). Basic recording tactics. In P. W. Darst, D. Zakrajsek, & V. H. Mancini, *Analyzing physical education and sport instruction* (2nd ed., pp. 19–53). Champaign, IL: Human Kinetics.

van der Mars, H. (1989b). Observer reliability: Issues and procedures. In P. W. Darst, D. Zakrajsek, & V. H. Mancini, *Analyzing physical education and sport instruction* (2nd ed., pp. 54–80). Champaign, IL: Human Kinetics.

van der Mars, H., & Harvey, S. (2010). Teaching and assessing racquet games using "Play Practice"—Part 2. *Journal of Physical Education, Recreation, and Dance, 81*(5), 35–43, 56. https://doi.org/10.1080/07303084.2010.10598478

van der Mars, H., Timken, G., & McNamee, J. (2018). Systematic Observation of Formal Assessment of Students by Teachers (SOFAST). *Physical Educator, 75,* 341–373. https://doi.org/10.18666/TPE-2018-V75-I3-8113

Veal, M. L. (1992). The role of assessment in secondary physical education: A pedagogical view. *Journal of Physical Education, Recreation, and Dance, 63*(7), 88–92. https://doi.org/10.1080/07303084.1992.10609932

Veal, M. L. (1995). Assessment as an instructional tool. *Strategies, 8*(6), 10–15. https://doi.org/10.1080/08924562.1995.10592045

Wiliam, D., Lee, C., Harrison, C., & Black, P. (2004). Teachers developing assessment for learning: Impact on achievement. *Assessment in Education, 11*(1), 49–65. https://doi.org/10.1080/0969594042000208994

Williams, L., & Rink, J. (2003). Teacher competency using observational scoring rubrics. *Journal of Teaching in Physical Education, 22*, 552–572. https://doi.org/10.1123/jtpe.22.5.552

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BASKETBALL FACILITY CASE STUDY

Scholastic Basketball Facilities: A Case Study of Schools Within One Midwestern State

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Abstract

High school basketball facilities have long been an integral component of athletics, physical education, and community programs, yet little scientific literature exists on these vital venues. This study assessed components of scholastic basketball venues and analyzed strengths and challenges associated with these facilities. An electronic survey was sent to all boys and girls head high school basketball coaches in a Midwestern state within the United States. This study analyzed data by calculating descriptive statistics for a number of facility components. Content analysis revealed that Condition and Design were perceived as strengths associated with the scholastic basketball facilities, while Ancillary Areas and Equipment were challenges. Future research should expand this methodology to regional and national populations.

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Secondary schools in the United States spend millions of dollars annually on maintaining or constructing athletic facilities. Whether adding a state-of-the-art football stadium, a multipurpose gymnasium, or strength and conditioning training facility, high school administrators are mimicking leaders at the intercollegiate and professional sport levels by adding these venues to their secondary school campuses. As Wilson (2013) indicated, a secondary school is more than the sum of its buildings; the venues that make up a high school campus are inevitably linked with the institution's mission. Athletic and physical education facilities are no different in this connection to institutional missions, as they facilitate the implementation of objectives set by community leaders, administrators, and coaches regarding the student-athletes within the school.

While these facilities are designed and constructed primarily to support interscholastic athletics, operation of these venues is also intended to support other academic, programmatic, and special-event-related activities. This requires consideration of several managerial components, such as scheduling, equipment inventory, maintenance, finance, legal issues, security, and risk management, to name a few. Anecdotal evidence suggests that serving these varied aims presents challenges for leaders working at the secondary school level, yet no known resources exist within the sports management and physical education literature to provide context to athletic administrators and coaches interested in making evidence-based decisions at their respective schools.

High school athletic departments have widely modernized or renovated existing facilities in recent years with an emphasis on efficiency, security, and promotion of school spirit or corporate sponsorship ("New Trends," 2016). Typically, facility features within a high school that support a scholastic basketball program include, but are not limited to, locker rooms, meeting spaces, offices, accommodations for maintenance and equipment storage, and athletic training areas. Sawyer and Gimbert (2013) noted that administrators should make long-range planning imperative to provide for the logical and most economical use of the venue, and arguably such decisions may be best assisted when decision makers are armed with greater knowledge of the spectrum of facilities available in contemporary high schools.

Toward such an aim of providing context of existing facilities in interscholastic athletics, Petersen (2013) analyzed space guidelines within indoor high school athletic facilities and established benchmarks for planning or renovating scholastic venues. Petersen concluded that it is vital for schools to establish guidelines and noted that inadequate space for athletic programs hinders the effective operation of the athletic programs and the students they serve. Hoffman (2015) reported similarly on the effect that corporate sponsorships have on scholastic sport venues. Recent examples (Cook, 2012; Coyne, 2016; Stewart, 2012) demonstrate the increasing significance of the corporate sponsorship trend in interscholastic athletics, as long-term contractual agreements with corporate entities are increasingly helping to fund, operate, and maintain facilities in secondary school settings (Neddenriep, 2016). These developments in interscholastic sports suggest that scholarly analysis of such trends in scholastic athletics is warranted.

Within the United States, the more than 23,000 high school athletic departments employ approximately 300,000 administrators, coaches, and officials in related roles (Forsyth & Olson, 2013). Additionally, the National Federation of State High School Associations (2016) noted that more than 7.8 million students participate in interscholastic competitions annually. These statistics make it important for athletic departments to designate proper attention to the facility aspect of the program. As scholastic sport facilities can potentially be a difference-maker in the overall success of an athletic program, administrators and coaches must continually evaluate their respective venues to maintain a level of competitiveness with their counterparts.

There is a shortage of literature related to secondary school venues and to high school basketball gymnasiums in particular. Such gaps in the literature warrant further study of interscholastic sports facilities.

Thus, this study assessed components of and various procedures employed in the sports administration of high school basketball facilities. This exploratory study produced descriptive data to answer research questions regarding (1) the basic components of and procedures used in the administration of high school basketball facilities, and (2) the perceived strengths and challenges associated with the administration of high school basketball facilities.

As conveyed, the literature shows few accounts of scholastic basketball venues, compared to the intercollegiate and professional sport sectors. Therefore, this study aimed to add to the scholarly literature on this topic.

Method

This section gives an overview of the research design, context, participants, instrument, and procedures used in this study. Additionally, it explains the data analysis techniques used.

Research Design

This study targeted high school basketball coaches within a state athletic association, selected out of convenience, and it employed both quantitative and qualitative research methods. The study used quantitative methods to gather statistical information on the data collected. The main purpose of descriptive statistics was to reduce the data to simpler and more understandable forms without distorting or losing much information (Agresti & Finlay, 2009). Qualitative methods were used on open-ended questions administered within the survey. These questions allowed respondents to describe the perceived strengths and challenges of leading the basketball program within their respective scholastic basketball facility.

Research Context

This study focused on high school basketball programs in the state of South Dakota, specifically members of the South Dakota High School Activities Association (SDHSAA). The SDHSAA (2016) serves member schools by providing leadership in the development, supervision, and conduct of interscholastic activities that enrich the educational experiences of high school students. The SDHSAA is committed to the ideals that provide equitable participation opportunities and positive recognition to students, and to working cooperatively with all schools to enhance the achievement of desired educational goals (SDHSAA, 2016).

Participants

Through purposive sampling, 326 basketball coaches in South Dakota were sent the electronic survey for the study. All participants were head basketball coaches for boys and girls programs of

SDHSAA member institutions. Participant contact information was acquired from the association's website. Head coaches were specifically chosen for the study because of their inherent knowledge of their respective basketball program.

Instrument

Because no existing instruments were relative to the specific purpose of this study, a new one was developed. The Western Kentucky University Scholastic Basketball Survey was created in consultation with professionals knowledgeable in the areas of scholastic basketball, coaching, and facility management. As recommended by Dillman (2007), the professionals thoroughly reviewed the survey questions and provided feedback, giving face validity to the construction of this instrument. The survey was structured to collect data on an array of components related to the administration of a high school basketball program, inclusive of facility features, operational practices, and coaches' perceptions of venue strengths and challenges. This study used Cronbach's alpha, calculated as .711, to further assess the instrument for validity; Pearson's correlation coefficient was calculated on 20 questions randomly selected from the survey, resulting in a test–retest value of $r = .63$.

Procedures

The Institutional Review Board at Western Kentucky University reviewed and approved this study. All required protocols were precisely followed throughout the study.

Several specific procedures were used during the data collection phase of the study. The electronic survey was developed and distributed via the online research suite Qualtrics (Provo, UT, USA). The link to the survey was sent to all boys and girls head basketball coaches within SDHSAA member institutions. To facilitate a higher response rate, the researchers sent all participants electronic correspondence regarding (a) an invitation e-mail with an explanation of the purpose of the study, (b) an implied informed consent, and (c) detailed instructions on how to complete and submit the survey. Two weeks after launch, a reminder e-mail was sent to participants who had not completed the survey.

An incentive was offered to participants as an additional measure of obtaining a higher response rate. Participants completing the survey were given the opportunity to be entered into a random drawing to win a $250 monetary donation to their basketball program.

Data Analysis

Quantitative survey data were analyzed using the computer software programs Microsoft Excel (Microsoft, Redmond, WA, USA) and IBM SPSS Statistics 21 (IBM SPSS, Armonk, NY, USA). These data analysis and subsequent reporting tools attempted to reduce the data to simpler and more understandable forms without distorting or losing important information (Agresti & Finlay, 2009). The open-ended questions were analyzed and categorized via a content analysis technique. As suggested by Bogdan and Biklen (2007), themes and patterns were identified and categories were developed that helped bring meaning to the study. Content analysis allowed for (1) the counting of instances to define frequency and (2) the creating of codes to define categories, essentially quantifying participant feedback.

Results

Responses were returned by 79 coaches from all over the state of South Dakota, for a response rate of 24%. The average student enrollment from respondent schools was approximately 375 students, with the maximum enrollment being in the 2,000–2,249 range. The majority (86%) of respondent schools were classified as public institutions.

Research Question 1

The first research question to be addressed was, what are the components of and procedures used in management of high school basketball facilities? To provide a synopsis of venue components and protocols, the researchers calculated descriptive statistics in the form of frequency distributions and percentages. Table 1 displays a summary of results.

Table 1
Summary of Scholastic Basketball Facility Components and Procedures

Component	*n*	%
Facility Age (in years)		
0–5	4	5
6–10	10	13
11–15	5	6
16–20	6	8
21–25	8	10
26+	35	44
Not Sure	11	14
Seating Capacity		
0–1,999	61	77
2,000–3,999	12	15
4,000–5,999	2	3
6,000–7,999	2	3
8,000+	1	1
Not Sure	1	1
Head Coach Office		
Yes	43	54
No	36	46
Dedicated Locker Room		
Yes	25	32
No	54	68
Exclusive Meeting Space		
Yes	26	33
No	53	67
Shares Venue With Other School Teams		
Yes	75	95
No	4	5
Facility Scheduler		
Athletic Director	75	95
Administrative Assistant	3	4
Principal/Assistant Principal	1	1
Maintenance Responsibility		
Athletic Director	19	24
Coach	3	4
Maintenance Division	51	64
Outside Contractor	1	1
Other	2	3
Not Sure	3	4

Scholastic basketball facility components and procedures assessed from the survey included (a) age, (b) seating capacity, (c) office for head coach, (d) dedicated locker room, (e) exclusive meeting space, (f) sharing of venue with other school athletic teams, (g) individual charged with scheduling the facility, and (h) maintenance oversight responsibility.

As Table 1 shows, basketball facilities in the 26 years or older range comprised the most responses in the age category. Regarding seating capacity, the range most reported by the respondents was 0–1,999, with 77% signifying their basketball venue fell into that capacity bracket. Slightly more than half (54%) of respondents reported that the venue included an office for the head basketball coach. The majority (68%) of respondents indicated that they did not have dedicated locker areas or an exclusive meeting room space within the facility.

Regarding policy and procedural variables, a majority (95%) of respondents conveyed that their basketball venue was shared with other athletic teams within the institution. Concerning facility scheduling, 95% of respondents noted that the school's athletic director managed the reservations for the venue. Finally, the results show that primarily, the institution's maintenance division (i.e., physical plant or custodial staff) performed maintenance duties and functions.

Research Question 2

The second research question that this study sought to answer was, what are perceived strengths and challenges associated with the high school basketball facility? Participants supplied 205 comments relative to this question. Regarding strengths of the venue, participants provided 112 comments that led to the emergence of five categories after the content analysis: (1) Condition, (2) Design, (3) Facility Components, (4) Atmosphere, and (5) Age.

Relative to challenges, participants furnished 93 comments. Five categories were developed from the content analysis: (1) Ancillary/Specialty Areas, (2) Equipment, (3) Size, (4) Sharing, and (5) Maintenance. Table 2 summarizes the comments of coaches' perceived strengths and challenges of their basketball facility, showing a breakdown of categories and themes that emerged.

Table 2
Content Analysis of Perceived Basketball Facility Strengths and Challenges

Category	Theme	Responses *n*
	Strengths	
Overall Condition	Adequacy/satisfaction	18
	Aesthetics	9
	Operations	6
Design	Functionality	15
	Seating capacity	10
	Efficiency/space utilization	4
Facility Components	Hardwood flooring	12
	Multiple basketball goal systems	10
	Seating options	4
Atmosphere	Strong home court advantage	11
	Character/mystique	5
Age	New	8
	Challenges	
Ancillary Areas	Lack of locker rooms	12
	Lack of weight room	11
	Lack of auxiliary gym	3
Facility Equipment	Technology needs	9
	Bleacher considerations	6
	Miscellaneous	6
Size	Too small	10
	Inefficiency	5
	Limited seating	3
Sharing	Sharing with other school sports	7
	Sharing with community	5
	Lack of access	4
Maintenance	Lack of daily upkeep	6
	Air conditioning needs	3
	Lighting needs/concerns	3

Regarding facility strengths, the category that received the most responses was Condition (n = 33). This category consisted of responses related to the overall condition of the facility. Themes that emerged from this category were general satisfaction of the venue, aesthetics, and operational practices. Brief comments such as "beautiful gym" and "venue is in great shape" made up the majority of responses. Comments directed toward Design (n = 29) made up the category with the second most responses. Themes within this category included venue functionality, suitable seating capacity, and maximum use of overall space. One coach offered, "Our basketball facility is connected to the high school, contains one full court, two smaller courts, and six baskets. This allows for better practices and game preparation." Responses regarding good flooring, multiple basketball goal systems, and the variety of seating options made up the Facility Components (n = 26) category. Responses in this category were geared toward tangible fixtures and equipment within the facility. The Atmosphere (n = 16) category emerged from themes associated with the facility providing a strong home-court advantage and the overall character represented by the venue. "Intimidating place" and "history" were commonly cited aspects of the facility's aura and environment. A participant remarked,"We have a great venue and it is a very intimidating place to play, giving us an advantage in our conference." Finally, comments regarding Age (n = 8) rounded out the responses relative to perceived strengths of high school basketball facilities. Each response in this category indicated the facility being "new" was a strength.

Concerning perceived facility challenges, the category that developed as having the most comments was Ancillary Areas (n = 26). Responses in this category referred to areas within the facility that are typically considered secondary or subsidiary. Comments such as "lack of" or "need for" locker rooms, a weight training area, and auxiliary space made up the majority of responses. In reference to ancillary areas being a burden to the program, one coach asserted, "A weakness of our facility is the lack of a weight room. Also, we have to split practices by traveling to another local gym. I believe issues like these are why fewer kids are coming out for the sport."

The Facility Equipment (n = 21) category accounted for the second most responses. Themes that formed within this category

concerned equipment needs such as outdated scoreboards, sound system upgrades, better bleacher options, and other miscellaneous equipment challenges. Comments such as "too small" and responses indicating inefficiency made up the Size (n = 18) category. One coach, noting venue size as a limitation, concluded,"Our facility is simply not adequate for a varsity basketball program, and with it being so small, we have no shot at hosting a tournament."

The Sharing (n = 16) category emerged from themes connected with splitting venue time with other school athletic teams and community programs. Some respondents specifically referenced "limited access" to their respective basketball facility. Finally, comments regarding Maintenance (n = 12) concluded the responses concerning perceived challenges of high school basketball facilities. Themes within this category included the lack of daily upkeep and replacement, needs, or concerns with critical building components. One coach revealed,"Our gym lighting is poor and it needs air conditioning. Our maintenance needs are not being heard."

Discussion

This study assessed components of the administration of scholastic basketball facilities. By assessing perceived venue strengths and challenges, the study summarized key facility components, as well as protocols employed in the management of venues. The many responses submitted by a relatively small number of participants show the interest in the topic and the potential effect that the basketball facility can have on a variety of elements within a scholastic athletic program. The results suggest that high school basketball coaches feel that overall condition and facility design are the biggest strengths of their respective facilities. Condition of the facility includes, but is not limited to, adequacy based on the scope of the program, aesthetics, and operational practices. Facility design includes space utilization, functionality, and efficiency.

Coaches' level of involvement and input in the facility planning and design stages of the basketball venue are unknown and are an important consideration for further research. Seidler and Goldfine (2013) suggested that facilities are often planned without in-depth consideration of the programs that they will support.

Surprisingly, nearly half (44%) of the respondents indicated that their basketball facility is 26 years old or older. Perhaps some of

these older facilities have been renovated, or school systems could be fiscally challenged and therefore building new is not an option. Evaluating the advantages and disadvantages of renovating an older facility requires expertise, a feasibility study, and evaluation of key questions regarding the athletic department, particularly the basketball program.

Implications

Key implications for scholastic athletic administrators and coaches can be derived from this study. These implications include (a) the importance of foundational data, (b) facility design considerations, and (c) professional development opportunities for coaches.

This study provides foundational data that can be used by administrators and coaches in the scholastic sport industry. The results provide a depiction of high school basketball facility components, procedures, and perceived strengths and challenges in one Midwestern state. Facility planners or facility managers can use this study to compare their program with these findings. The results specific to facility strengths and challenges can be particularly beneficial to those planning a new high school basketball facility, as findings can reinforce venue planning ideas and potentially help planners to avoid mistakes and oversights that will greatly affect the program.

The effect of proper facility planning and design cannot be overlooked. As noted, results show that coaches deem overall design as a strength to their basketball facility. The level of involvement that participants had in planning and design phase of their venue is unknown, but the findings from this study show that input from the basketball coach should be considered. Having representation from the head basketball coach on the master plan and/or design team committee can aid in the identification of the institution's goals and objectives for a new facility. Involving the coach or physical education teacher in any site visits, if feasible, to other well-designed scholastic venues could be impactful and should be considered as a way of maximizing planning efforts.

A final implication is that scholastic basketball coaches need to be involved in planning and management decisions, as they are one of the primary tenants and stakeholders in the venue. With this notion, coaches should be receptive to and prepared for this secondary duty. Professional associations, such as the National

Interscholastic Athletic Administrators Association (NIAAA), provide educational and leadership opportunities, including courses in facility and equipment management, for individuals who work in scholastic sports. Additionally, professional associations, state high school athletic associations, and undergrad sports administration programs offer conferences or courses that showcase the latest trends in facility planning and equipment management.

Limitations

The survey instrument for this study was administered electronically. This format may have posed challenges for some participants. Additionally, the self-report format of the survey may have led to somewhat skewed data, because respondents may not have returned accurate responses. However, the test–retest analysis conducted on this survey suggests that reasonable confidence may be placed on these results relative to the high school basketball facilities in this Midwestern state.

Another limitation of the study was the relatively low number of participants. This was an exploratory study consisting of high school basketball coaches only in the state of South Dakota, which may be further compounded by the fact that South Dakota is a state with one of the lowest population densities in the United States. Thus, readers are cautioned against generalizing these findings to other states or geographic regions within the United States. In sum, these findings lack the potency that a multistate study could seemingly produce.

Recommendations for Further Research

This study warrants further research on scholastic basketball facilities. Because this study centered on one state, South Dakota, an obvious direction for future research is an expansion to multiple states. Widening the study to collect data and perceptions from a larger participant base could conceivably lead to more meaningful and representative results. In addition to expanding the study to multiple states, future inquiries on the topic could include athletic directors. Gaining insights from an athletic director's perspective could be impactful, as this study only collected basketball head coaches' perceptions.

Another area of future research to be considered is an assessment of recent trends and innovations in high school athletic facilities.

With the seemingly limited amount of literature on the topic, an assessment of trends in scholastic equipment, facility planning, design, and management is needed.

Finally, a research project similar in scope to this one could focus on intercollegiate athletic basketball arenas. Aside from collecting coaches' perceptions of basketball arena strengths and challenges, such a study could obtain data to summarize a variety of factors in which the venue impacts the basketball program. Specifically, a study of the level of influence that athletic facilities have on the recruitment and decision-making process of prospective student-athletes could benefit college coaches, athletic directors, and those responsible for key facility initiatives on campus.

Conclusion

This study contributed to the literature in physical education, sport administration, and specifically the administration of sports facilities on the scholastic level. This study documented the perceived strengths and challenges associated with administration of high school basketball facilities in one Midwestern state. In addition, it described the primary components and various procedures employed in these venues. Interscholastic athletic directors and coaches may find value in the results due to their unique relationship with the topic. Similarly, given the little existing literature on interscholastic sports, scholars working in this area may discover meaning in these findings given the light they shed on this topic.

References

Agresti, A., & Finlay, B. (2009). *Statistical methods for the social sciences*. Upper Saddle River, NJ: Pearson Prentice Hall.

Bogdan, R. C., & Biklen, S. K. (2007). *Qualitative research for education: An introduction to theories and methods* (5th ed.). Boston, MA: Allyn and Bacon.

Cook, B. (2012, August 30). School district tries to scare up $3 million in advertising to pay for sports. *Forbes*. Retrieved from http://www.forbes.com/sites/bobcook/2012/08/30/school-tries-to-scare-up-3-million-in-advertising-to-pay-for-sports/-3c1271714b00

Coyne, T. (2016, May 14). Your stadium here: Public schools cash in with naming rights. Retrieved from http://bigstory.ap.org/article/206064d6a56d43a7a7948956f9f51686/your-stadium-here-public-schools-cash-naming-rights

Dillman, D. A. (2007). *Main and Internet surveys: The tailored design method*. Hobolken, NJ: John Wiley and Sons.

Forsyth, E., & Olson, J. (2013). Introduction. In M. Blackburn, E. Forsyth, J. Olson, & B. Whitehead (Eds.), *NIAAA's guide to interscholastic athletic administration* (pp. ix–xvi). Champaign, IL: Human Kinetics. https://doi.org/10.1111/cons.12026

Hoffman, K. (2015, May 4). The trend of stadium sponsorships. *Coach and A.D*. Retrieved from https://coachad.com/articles/the-trend-of-stadium-sponsorships/

National Federation of State High School Associations. (2016). *2015–16 high school athletics participation survey.* Retrieved from http://www.nfhs.org/ParticipationStatistics/

Neddenriep, K. (2016, September 9). Strapped for cash, high schools sell football stadium names. *Indianapolis Star*. Retrieved from http://www.indystar.com/story/sports/high-school/2016/09/09/strapped-cash-high-schools-sell-football-stadium-names/89954788/

New trends in facilities. (2016, March 25). *Athletic Management*. Retrieved from http://athleticmanagement.com/content/new-trends-facilities

Petersen, J. C. (2013). High school indoor athletic facility space planning guidelines. *Journal of Facility Planning, Design, and Management, 1*(1), 1–15.

Sawyer, T. H., & Gimbert, T. L. (2013). Designing facilities for K–12 health, physical education, and driver education. In T. Sawyer (Ed.), *Facility planning and design for health, physical activity, recreation, and sport* (pp. 323–342). Urbana, IL: Sagamore.

Seidler, T., & Goldfine, B. (2013). Prologue. In T. Sawyer (Ed.), *Facility planning and design for health, physical activity, recreation, and sport* (pp. xiii–xiv). Urbana, IL: Sagamore.

South Dakota High School Activities Association. (2016). About the SDHSAA. Retrieved from http://www.sdhsaa.com/AboutUs/AbouttheSDHSAA.aspx

Stewart, M. (2012, September 3). Naming rights trickle down to high school level. *Milwaukee Journal Sentinel*. Retrieved from http://www.jsonline.com/

Wilson, C. (2013). Facilities. In M. Blackburn, E. Forsyth, J. Olson, & B. Whitehead (Eds.), *NIAAA's guide to interscholastic athletic administration* (pp. 339–359). Champaign, IL: Human Kinetics.

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FACILITY RISK MANAGEMENT

Physical Education and Athletic Facility Emergency Readiness: The Emergency Action Plan

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Abstract

The emergency action plan (EAP) at physical education and sport venues is a necessity, no matter the level. Although medical emergencies are rare, an EAP helps to ensure a smooth response, necessary for positive outcomes. Many entities should be involved developing the EAP. All personnel who act in an emergency must be trained in first aid and cardiopulmonary resuscitation, and automated external defibrillators should be readily available. This article assists administrators with developing and implementing emergency planning at all facilities that host athletic events at any level. This article breaks down an EAP into its two central components: equipment and personnel.

Physical education teachers, coaches, officials, and athletic administrators are no exception to risk assessment and management. Medical emergencies are not common occurrences, yet emergency planning is important for all personnel associated with facilities that host physical education classes and athletic events. From a recreational level to a professional sports team level, associated personnel must be prepared for potential emergencies. A 2008 study by the National Council of Youth Sports reported that over 60 million

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children ranging in age from 6 and under to 18 years old participate in youth sports. From 2013 to 2014, the National Federation of State High School Associations (2014) indicated almost 7.8 million participants in high school sports around the United States, while the National Collegiate Athletic Association (Irick, 2014) reported over 470,000 participants during the same time. Data gathered from 1980 to 2006 show that 1,866 young, competitive athletes ranging from 8 to 39 years of age died suddenly in the United States (Maron, Doerer, Haas, Tierney, & Mueller, 2009). While 80% of deaths were attributed to cardiovascular events occurring during or just after physical exertion, 22% of deaths were a result of blunt trauma, particularly to the head and neck. More notably, of those cardiovascular-related deaths, most who died were participating in sanctioned high school, middle school, or youth sports. Many of these deaths are avoidable given proper prevention, recognition, and treatment protocols (Casa et al., 2013). Collegiate and secondary school athletic programs, as well as recreational sports facilities, would benefit greatly from having an athletic trainer (AT) to lead these efforts. Unfortunately, schools and recreational athletic settings rely on athletic directors, coaches, or club administrators to ensure the safety of sports participants, as these organizations lack appropriate medical personnel in many instances (Casa et al., 2012).

For the athlete to have the best possible outcome, competent and immediate care is critical, as a delay of care until emergency medical responders arrive may result in disability or death (Casa et al., 2012). At a minimum, all coaches should be trained in first aid, cardiopulmonary resuscitation (CPR), and the use of the automated external defibrillator (AED; Casa et al., 2012; Drezner et al., 2007; Pryor et al., 2014). An AED should be available within 3 to 5 min of collapse, with the gold standard being 1 min (Pryor et al., 2014). This may mean that numerous AEDs are required, particularly in places with multiple athletic venues in various locations, especially for off-campus facilities. A recent study concluded that high schools with more than one AED were more likely to ensure early defibrillation, but that 84.6% of schools with AEDs indicated early defibrillation (defined as less than 3 to 5 min from time of collapse) was possible at every athletic venue (Toresdahl, Harmon, & Drezner, 2013).

While having personnel with CPR and AED training would be advantageous when an athlete sustains a cardiovascular event, several other causes of significant injury or sudden death (e.g., blunt trauma, heat stroke, pulmonary conditions) require personnel to be trained in first aid to save the life of the athlete. For this reason, schools and recreational sports facilities (that sponsor athletic events) should hire an AT, who is a licensed medical professional trained in preventing, recognizing, and treating emergency conditions in physically active individuals (Casa et al., 2012; Pryor et al., 2014). However, recent data indicate that less than 40% of public high schools in the United States employ full-time ATs (Pryor et al., 2015), and one would suspect that even fewer athletic club organizations employ ATs. Because of the relatively low incidence of emergencies in sports (Maron et al., 2009), athletic administrators and personnel develop a false sense of security and become complacent in terms of emergency preparedness. Emergency preparedness should involve many individuals including qualified medical personnel, organization administrators, coaches, and others (Almquist et al., 2008; Casa et al., 2013). However, the lack of access to qualified medical personnel in many athletic settings hinders the development of a comprehensive emergency action plan (EAP). The health and safety of secondary school, recreation, and club athletes are of utmost concern for stakeholders, including health care professionals, administrators, coaches, parents, and athletes (Casa et al., 2013). Therefore, this article assists organizations and administrators with implementing emergency planning at all facilities that host athletic events at any level.

Emergency Action Plans

All organizations that host athletic events should have an EAP (Almquist et al., 2008; Casa et al., 2013; Casa et al., 2012; Drezner et al., 2007; Pryor et al., 2014; Toresdahl et al., 2013). Both the National Collegiate Athletic Association (2014) and the National Association of Intercollegiate Athletics (2016), as well as the National Federation of State High School Associations (2016), recommend that a written EAP be developed for each athletic venue. This type of EAP is specific to medical conditions that occur on an athletic field, versus the type of EAP a school might have developed to prepare for emergencies

such as fire, tornado, or an active shooter. The athletic EAP should be considered the road map for handling medical emergencies (Andersen, Courson, Kleiner, & McLeod, 2002). It should be comprehensive, yet flexible enough to be adapted to any emergency situation. At a minimum, the types of catastrophic injuries and illness for which the EAP should be designed include, but are not limited to, catastrophic brain injuries, heat illnesses, spinal cord injury, cardiac distress and arrest, respiratory distress, exertional sickling, asthma, concussion, and diabetes (National Collegiate Athletic Association, 2014). Figure 1 provides a template for an EAP with a sample of the type of information to be included. The institution or organization can modify this to fit its needs.

Development of the EAP

Ideally, administrators of that organization (e.g., athletic directors and league officials) develop the EAP, in collaboration with other associated personnel, including ATs, coaches, school nurse, team physician, and campus public safety officials (Casa et al., 2013; Casa et al., 2012; Drezner et al., 2007). In addition to on-site personnel, local emergency medical services (EMS) personnel should be involved in developing the EAP (Andersen et al., 2002; Casa et al., 2012). Personnel from local emergency facilities to which an athlete would be transported should also be included in developing the EAP for the organization or institution (Andersen et al., 2002). This will help familiarize all individuals involved in the response to an emergency of the steps to take, as well as the anticipated response to an emergency.

One important feature of the EAP is that it must be specific to the athletic venue (Andersen et al., 2002; Casa et al., 2013). In other words, a high school should write an EAP for each athletic venue (e.g., baseball field, football stadium, basketball court, field house, swimming pool) in which sanctioned athletic events occur. Because each athletic venue has a specific location and/or unique access points and characteristics, simply referring to the general facility (e.g., providing the school's address) is inadequate if the athletic venue is located in an area not directly associated with the address of the main school or recreational sports facility. The athletic venue–specific EAP should include a list of emergency phone numbers, a facility map with street address, and pertinent directions to

Name of Sport and Venue: Men's Basketball/Smith Arena

Address: 1000 W. Arena Drive, Smithville, IN

Venue Directions: From Tiger Drive, enter parking lot adjacent to tennis courts (on the north side of the arena). Enter through Gate 1.

GPS Coordinates (for medical helicopter transport)**:** 00 00.00 / 00 00.00

[Insert Map of Venue Here, e.g., Google Maps or Campus Map]

Emergency Personnel: Coach assumes the role of first responder (in the absence of an AT or team physician).

Emergency Communication: Cell phones provided by the coaching staff will be used.

Emergency Equipment: First aid kit (location: equipment room), AED (location: concession stand), Splints (location: equipment room).

Role of First Responders:

1. Assessment and immediate care of the injured/ill athlete(s)
2. Activation of EMS
   Call 911 (or other emergency number, if relevant)
   Provide the following information:
   - Caller Name
   - Venue Address
   - Phone Number
   - Number/Condition of the Injured Individual(s)
   - First Aid Treatment Initiated
   - Specific Directions to the Venue
   - Other Information as Requested (do NOT hang up before the dispatcher does)
3. Retrieval of emergency equipment
4. Direct EMS to scene
   - Open appropriate gates/unlock appropriate doors
   - Designate individual to "flag down" EMS and direct to the location of the emergency
5. Member of the coaching staff must accompany the injured athlete to the emergency room. Bring athlete medical card and insurance information.
6. Activate communication tree (to notify medical personnel, administration, etc.)
7. Document the incident

Figure 1. Emergency action plan template and sample. Plan should be adjusted based on the availability of qualified medical personnel.

the athletic venue that will guide EMS personnel (Casa et al., 2013), in addition to the specific procedural steps that should be taken in a medical emergency. This EAP should be posted or easily accessible at the athletic venue, and all personnel should be familiar with the EAP at that venue, as well as know where the EAP is posted (Casa et al., 2013). In conclusion, having an athletic venue–specific EAP will ensure that appropriate steps are taken during a crisis.

Prior to distribution and implementation, all administration, as well as the appropriate legal counsel, should review and approve the EAP (Andersen et al., 2002). Legal counsel is often overlooked prior to implementation, but is necessary from a risk management and liability perspective for all parties who are directly involved with the plan. Once approved and documented, the EAP should be distributed to anyone involved with athletics at that organization, including organizational leaders, administrators, ATs, physicians, and coaches (Andersen et al., 2002). All members of the organization who may respond to an emergency must be properly educated. This education should ensure that personnel are aware of the EMS system that will respond, as well as of the emergency medical facilities where an athlete may be transported (Andersen et al., 2002). All members of the organization who may be called to respond in an emergency should be aware of their role when the EAP is activated.

Components of the EAP

The EAP is a step-by-step plan of action that will be taken in an emergency. Typically, the first step of the plan requires activating EMS (Andersen et al., 2002). In many locales, calling 911 activates EMS; however, a different emergency number must be used in some cases. The phones (landline and/or mobile) that will be used to activate EMS should also be identified at each facility and the location of the landline indicated on the athletic venue–specific map (Walsh, 2001). The athletic venue–specific map should include a visual overview of the immediate area, with streets clearly labeled. The EAP should include the information for the caller to provide to EMS personnel, and this should include (at a minimum) the specific athletic venue address and location (if adjacent to the address) with appropriate entrance point and cross streets identified. Also, EMS personnel should be provided with (1) identification of the caller

(e.g., Joe Smith, assistant athletic director), (2) number and condition of athletes affected (e.g., one football player who is unconscious), and (3) emergency treatment that has already been initiated (e.g., assistant coach has initiated CPR). It is important that the caller allow the dispatcher to end the call, because the dispatcher may need additional information before disconnecting.

Once EMS has been activated, the responders should continue to provide appropriate emergency care until EMS arrives (Andersen et al., 2002). It is particularly helpful to EMS that the caller meets the incoming responding vehicle near the entrance to the athletic venue identified in the EAP (Miller & Berry, 2011). This will guide EMS to the correct location and avoid a potentially life-threatening delay in care. When EMS does arrive, more condition-specific information, such as athlete medical history (if known) and the on-site treatment that was provided, should be given (Andersen et al., 2002). Ideally, the individual who rendered care on-site accompanies the athlete to the hospital with the appropriate medical documentation (i.e., insurance, emergency contact, medical history, allergy information). This is especially important in the absence of a parent or other family member, in which case the person responding can provide the hospital with personal information.

The probability of a successful outcome for a victim of sudden cardiac arrest, which is the most common cause of sudden death in athletes (Maron et al., 2009), is based on several time-sensitive intervals, which should be considered in the development of the EAP. These include (1) time from collapse to EMS activation, (2) time from collapse to the start of CPR, (3) time from collapse to delivery of the first shock of the AED, and (4) time from collapse to arrival of EMS (Drezner et al., 2007). Ideally, the organization or institution should plan in the EAP for less than 1 min to activate EMS and initiate high-quality CPR (American Heart Association, 2015). From there, it is recommended that the time from collapse to shock of the AED be 3 to 5 min (Pryor et al., 2014). If the time from collapse to shock could exceed this, then the organization or institution should obtain additional AED units to store in a facility (identified in the EAP) that is accessible to appropriate responders and would allow appropriate response time.

The EAP should also indicate the steps that should be taken after EMS transports the athlete. If the organization staffs any sports medicine personnel (e.g., AT, physician) to provide services, that person should be notified of the situation (Andersen et al., 2002). Furthermore, a parent or family member of the athlete should be contacted, as well as the athletic administration and/or coach (if not present during the emergency). Also, the EAP should indicate that appropriate documentation should be completed after the event (Anderson, 2006).

Equipment

One critical aspect of the EAP is that all responders know the types and locations of medical equipment that may be used in an emergency (Miller & Berry, 2011). The institution or organization should designate someone to be responsible for ensuring that emergency equipment (e.g., AED) is in good working order and that it is checked regularly (Andersen et al., 2002). It has been well established that early defibrillation with an AED is critical to survival in a cardiovascular event in the general population (American Heart Association, 2015). While many schools and recreational sports facilities have an AED, personnel must be trained in using it properly (Andersen et al., 2002).

Other equipment that may be need to be accessible in an emergency (based on state practice acts) includes CPR masks, splints, epi-pens for allergic reactions, flotation devices for a pool, and other devices. Anyone who may be responding to an emergency must be familiar with the location of emergency equipment and how to access it in an emergency.

Last, if medical personnel are not regularly in attendance at athletic events, coaches should have access to a first aid kit that includes the items necessary to act in an emergency based on their level of training. Also, athlete information including emergency contact information and underlying medical conditions that may be important to know in an emergency should be accessible on-site. The athlete information could be stored in a first aid kit; however, this may violate confidentiality if multiple people have access to the first aid kit.

Personnel

The personnel who may respond to an emergency at schools and recreational sports facilities will vary. Anyone involved with any practices, athletic events or competitions, skills instruction, and/or strength training and conditioning must be properly trained and prepared to handle a medical emergency (Andersen et al., 2002). The institution or organization should determine an EAP coordinator, who will be responsible for training and documenting the necessary components of EAP training (Drezner et al., 2007). Ideally, this individual should be the AT, as he or she has received the necessary formal education and training related to emergency preparedness (Casa et al., 2013). However, since an AT may not be employed at all athletic facilities, another individual should be identified for this role so that it remains a priority. As stated, all coaches should be trained in first aid, CPR, and the use of an AED (Casa et al., 2012; Drezner et al., 2007; Pryor et al., 2014).

Since various people may respond to an emergency, the implementation and rehearsal of the EAP is critical (Andersen et al., 2002). Each individual must understand his or her roles and responsibilities during an emergency (Miller & Berry, 2011), while the individual providing administrative oversight must be familiar with the whole plan. This starts with all involved parties reading and understanding the EAP, followed by practicing the EAP. Because each athletic venue is unique (location, available equipment, personnel), the EAP for each venue should be individually rehearsed with the responders at that venue (Miller & Berry, 2011). This may be best accomplished through planned in-service meetings and may involve local EMS. The ability to identify weaknesses in the plan prior to an actual event allows for a targeted quality improvement program so when a medical emergency occurs, all parties involved understand their collective responsibilities. No scheduled athletic activity, including strength training and conditioning sessions, should occur until the athletic administrator or league official has confirmed that all personnel associated with that activity are fully familiar with the EAP (Casa et al., 2013).

Review of the EAP

Once the EAP has been developed and approved, and available equipment and personnel who may be responding identified and educated, the EAP can be implemented for use. This fluid document will change regularly, as personnel, facilities, needs, or equipment will change over time (Andersen et al., 2002; Casa et al., 2013). Revisions may be made to the EAP after an initial rehearsal (Miller & Berry, 2011). One thing is for certain: The EAP should be reviewed and rehearsed annually, with documentation to support the rehearsal and any changes made (Andersen et al., 2002; Casa et al., 2013; Casa et al., 2012). The annual review and rehearsal of the EAP should always involve local EMS (Andersen et al., 2002) and should be led by the AT, if the institution or organization employs one (Casa et al., 2013). If any changes are made to the EAP at any time, administrative authorities and legal counsel must approve the newly revised EAP (Andersen et al., 2002). The updated EAP must be then disseminated to all appropriate personnel (Casa et al., 2013).

One strategy that has been suggested is the use of a "time out" prior to the start of athletic events (National Athletic Trainers' Association, 2012). A time out is a brief meeting in which athletic health care professionals gather prior to the start of the athletic event to review the venue's EAP (National Athletic Trainers' Association, 2012). For schools and recreational sports facilities not employing an AT, the use of the time out is imperative and should be led by the EAP coordinator and conducted with personnel who will be present and responsible for providing care at that athletic venue during an emergency. The time out checklist (Table 1) should include the role and location of all personnel, means of communication, designated hospital that will be used in an emergency, identification and location of emergency equipment, and any other issues that may affect the EAP (e.g., weather and special events; National Athletic Trainers' Association, 2012).

Conclusion

The vast use of resources, time, and finances necessary in almost every accident and the ensuing lawsuit can have a profound effect on any organization. In summary, all organizations and institutions that host athletic events should develop and implement an EAP

Table 1
Pre–Athletic Event Checklist

Checklist item	Description
Who Is Involved?	All those responsible for responding to a medical emergency meet before the start of each competition to review the emergency action plan.
Roles of Each Responder	Determine the role and location of each responder present.
Communication	Establish how communication will occur (i.e. radio, phone, voice commands, hand signals). What is the primary mechanism for communication? Is there a backup form of communication?
Presence of EMS?	An ambulance should be present at all high-risk events. Where is the ambulance located? What is the planned route for entrance/exit and is the normal route hindered (i.e., special event, crowd, construction)? Is the ambulance a dedicated unit or on standby? If an ambulance is not on-site, what is the mechanism for calling one?
Identification of Hospital	If emergency transport is needed, what is the designated hospital? If several choices locally, consider the most appropriate facility for the injury/illness in question.
Equipment Available	What emergency equipment is available, and where is it located? Has it been checked to ensure it is in good working order?
Other Factors	What other factors/issues could affect implementation of the emergency action plan (i.e., weather, special event, construction)?

Note. Adapted from the *National Athletic Trainers' Association Official Statement on Athletic Health Care Provider "Time Outs" Before Athletic Events,* by National Athletic Trainers' Association, 2012 (https://www.nata.org/sites/default/files/timeout.pdf).

(Almquist et al., 2008; Casa et al., 2013; Casa et al., 2012; Drezner et al., 2007; Pryor et al., 2014; Toresdahl et al., 2013). The health and safety of athletes are of utmost concern for administrators, coaches, parents, athletes, and health care professionals (Casa et al., 2013). Furthermore, organizations and institutions have a legal obligation to protect participants and themselves by ensuring prompt and appropriate emergency care (Andersen et al., 2002). Even expectations for appropriate emergency care at the youth sports level have become more rigorous (Casa et al., 2012). The absence of an EAP, which is paramount for responding to a medical emergency and providing appropriate care, may leave the institution or organization vulnerable to a legal liability situation (Casa et al., 2012).

A well-designed EAP includes several components, including communication, transportation, documentation, equipment, and personnel (Andersen et al., 2002). While the outline for an EAP exists, each institution or organization should develop the EAP in accordance with its unique needs and available resources. In addition to developing the EAP, the institution or organization may want to investigate other policies that affect risk management, including environmental issues (e.g., heat, cold, lightning), sudden cardiac arrest, and concussions. It is important that organizations and institutions are also cognizant of state legislation, such as concussion management and the prevention of sudden cardiac arrest, both of which are directly related to athlete health and safety. It is the responsibility of organizational leaders, coaches, and health care professionals to develop and implement EAPs for the safety of all participating athletes.

References

Almquist, J., Valovich McLeod, T. C., Cavanna, A., Jenkinson, D., Lincoln, A. E., Loud, K., . . . Woods, T. S. (2008). Summary statement: Appropriate medical care for the secondary school-aged athlete. *Journal of Athletic Training, 43*, 416–427. https://doi.org/10.4085/1062-6050-43.4.416

American Heart Association. (2015). *Highlights of the 2015 American Heart Association guidelines update for CPR and ECC.* Retrieved from http://eccguidelines.heart.org/wp-content/uploads/2015/10/2015-AHA-Guidelines-Highlights-English.pdf

Andersen, J., Courson, R. W., Kleiner, D. M., & McLeod, T. A. (2002). National Athletic Trainers' Association position statement: Emergency planning in athletics. *Journal of Athletic Training, 37*, 99–104.

Anderson, B. (2006). Policies and philosophies related to risk management in the athletic setting. *Athletic Therapy Today, 11*(1), 10–16. https://doi.org/10.1123/att.11.1.10

Casa, D. J., Almquist, J., Anderson, S. A., Baker, L., Bergeron, M. F., Biagioli, B., . . . Valentine, V. (2013). The Inter-Association Task Force for Preventing Sudden Death in Secondary School Athletics Programs: Best-practices recommendations. *Journal of Athletic Training*, *48,* 546–553. https://doi.org/10.4085/1062-6050-48.4.12

Casa, D. J., Guskiewicz, K. M., Anderson, S. A., Courson, R. W., Heck, J. F., Jimenez, C. C., . . . Walsh, K. M. (2012). National Athletic Trainers' Association position statement: Preventing sudden death in sports. *Journal of Athletic Training, 47*, 96–118. https://doi.org/10.4085/1062-6050-47.1.96

Drezner, J. A., Courson, R. W., Roberts, W. O., Mosesso, V. N., Jr., Link, M. S., & Maron, B. J. (2007). Inter-Association Task Force recommendations on emergency preparedness and management of sudden cardiac arrest in high school and college athletic programs: A consensus statement. *Journal of Athletic Training, 42,* 143–158. https://doi.org/10.1016/j.hrthm.2007.02.019

Irick, E. (2014). *2013–2014 NCAA sports sponsorship and participation rates report.* Retrieved from National Collegiate Athletic Association website: http://www.ncaapublications.com/productdownloads/PR1314.pdf

Maron, B. J., Doerer, J. J., Haas, T. S., Tierney, D. M., & Mueller, F. O. (2009). Sudden deaths in young competitive athletes: Analysis of 1866 deaths in the United States, 1980–2006. *Circulation, 119,* 1085–1092. https://doi.org/10.1161/CIRCULATIONAHA.108.804617

Miller, M. G., & Berry, D. C. (2011). *Emergency response management for athletic trainers.* Baltimore, MD: Lippincott Williams and Wilkins.

National Association of Intercollegiate Athletics. (2016). *NAIA 2016–2017 athletic trainers manual.* Kansas City, MO: Author.

National Athletic Trainers' Association. (2012). *National Athletic Trainers' Association official statement on athletic health care provider "time outs" before athletic events*. Retrieved from https://www.nata.org/sites/default/files/timeout.pdf

National Collegiate Athletic Association. (2014). *2014–15 NCAA sports medicine handbook.* Retrieved from https://www.ncaapublications.com/p-4374-2014-15-ncaa-sports-medicine-handbook.aspx

National Council of Youth Sports. (2008). *Report on trends and participation in organized youth sports*. Retrieved from http://www.ncys.org/pdfs/2008/2008-ncys-market-research-report.pdf

National Federation of State High School Associations. (2016) *Sports medicine handbook* (5th ed.). Retrieved from http://www.nfhs.com/p-855-nfhs-sports-medicine-handbook-5th-edition.aspx

National Federation of State High School Associations. (2014). *2013–14 high school athletics participation survey results.* Retrieved from http://www.nfhs.org/ParticipationStatics/PDF/2013-14_Participation_Survey_PDF.pdf

Pryor, R. R., Casa, D. J., Vandermark, L. W., Stearns, R. L., Attanasio, S. M., Fontaine, G. J., & Wafer, A. M. (2015). Athletic training services in public secondary schools: A benchmark study. *Journal of Athletic Training, 50,* 156–162. https://doi.org/10.4085/1062-6050-50.2.03

Pryor, R. R., Huggins, R. A., & Casa, D. J. (2014). Best practice recommendations for prevention of sudden death in secondary school athletes: An update. *Pediatric Exercise Science, 26*, 124–126. http://dx.doi.org/10.1123/pes.2014-0014

Toresdahl, B. G., Harmon, K. G., & Drezner, J. A. (2013). High school automated external defibrillator programs as markers of emergency preparedness for sudden cardiac arrest. *Journal of Athletic Training, 48,* 242–247. https://doi.org/10.4085/1062-6050-48.1.20

Walsh, K. (2001). Thinking proactively: The emergency action plan. *Athletic Therapy Today*, *6*(5), 57–62. https://doi.org/10.1123/att.6.5.57

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FITNESS

Becoming One in the Fitness Segment: Physical Education and Mathematics

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Abstract

A considerable amount of evidence supports the value of teaching physical education (PE) and the Common Core in unison. This study investigated mathematics concepts taught during fitness segments in elementary PE. Specifically, we studied student perceptions about linking PE activities and mathematics. We wanted to determine if math concepts could be added to the fitness portion of elementary PE classes without a reduction in the amount of physical activity performed, and if student absorption of mathematics knowledge increased by combining the two fields. Fifty-five upper elementary-age students (8–12 years old) of various ethnic backgrounds from one school in Arizona participated. They wore pedometers and also completed mathematics worksheets preintervention and postintervention. Results showed that 54 of 55 students had extremely positive perceptions, indicating their enjoyment of mathematics as a part of the fitness activity. The students completed the math problems during the fitness segment, with a significant increase in mathematics knowledge. We did not find significant differences between step counts in the regular fitness and mathematics fitness segments. The students enjoyed the mental challenge of mathematics content while being physically active in the fitness segment of the class.

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A growing body of evidence suggests that partnering with teachers from other subject areas can improve learning across content areas. Cross-content linking can help build partnerships with classroom teachers who are concerned about high-stakes testing (Wright, 2009), and it may also lead to the development of allies who support and move forward the physical activity agenda. When physical education (PE) and mathematics are combined, students are receiving content in a new and captivating way and are experiencing increased cognitive function post–physical activity (Scrabis-Fletcher, 2016). This study shows that with more mathematics planned into the PE classroom, students can learn PE and math concepts, which could lead to a lifetime of health and mathematics.

Mathematics and Physical Education

With proper planning, mathematics can be effectively added to PE to benefit mathematics knowledge (Usnick, Johnson, & White, 2003). In the Usnick et al. (2003) study, third to fifth grade students (for example) were engaged in geo-dancing to help them develop an understanding of spatial concepts, symmetry, and sequencing. Students who struggled with spatial concepts and sequencing in math did exceptionally well in a physical activity environment that embedded mathematics. Students also reported positive attitudes about this combined exercise, calling it "physical math."

Reed et al. (2010) used the opposite integration, implementing physical activity into a core curricula (i.e., Language Arts, Math, and Social Studies) for 30 min/day, 3 days/week. The experimental group averaged roughly 1,200 pedometer steps each integration day, which meets the recommended 1200–2000 steps in a 30-min PE class (Pangrazi, 2007). This group also achieved significantly higher test scores on the Social Studies state-mandated academic achievement test. Additionally, the experimental group received higher scores on achievement tests in the areas of mathematics, science, and language arts.

Several studies have explored cross-disciplinary relationships among content areas (e.g., DeFrancesco & Casa, 2013; Peters, Geiger, Goos, & Dole, 2012; Phillips & Marttinen, 2013; Wade, 2016). For example, Hatch and Smith (2013) studied a PE activity in mathematics and physics classrooms. The study theme was projectile motion, and students were given different roles. One student threw the object, and then group members later studied the video of the object being

thrown. The study results showed the cross-disciplinary approach led to significantly increased student learning related to projectile motion and math concepts and to increased physical activity participation. Peters et al. (2012) incorporated mathematics concepts into PE, and although the students learned a lot about conversions, math (rather than physical activity) consumed most of the lesson time.

Multiactivity Conceptual Framework

The conceptual framework guiding this study is the multiactivity PE curricular model, in this case, the Dynamic Physical Education curricular model (Pangrazi, 2007). In this model, the lesson has four parts (introductory activity, fitness, lesson, and game). This model provides teachers an opportunity to seamlessly implement the math content activities during the fitness portion of the lesson through the model of Knowledge-in-Action (KIA; Hodges, 2015). The KIA format includes using station activities for physical activities that require students to talk about concepts (e.g., take your heart rate). In this study, PE teachers used the KIA format to incorporate mathematics concepts into the fitness segment.

This study aimed to investigate mathematics concepts taught during fitness segments in elementary PE. First, we investigated student perceptions about the link of PE and mathematics. Second, we sought to determine if mathematics concepts could be added to the fitness segments of PE classes without a reduction in the amount of physical activity performed. Finally, we were interested if mathematics knowledge increased (assessed by worksheets) over the 4-week intervention project.

Method

Participants

Students. Participants were from one school consisting of two third grade and two fourth grade classes. Human subjects approval was obtained from the university and school district, with parents providing consent and students providing assent. Four class groups with a total of 55 students, 25 boys and 30 girls, from a public charter school consisting of 487 students participated. Six participants were removed from the study (five due to absences and one due to behavioral issues). Table 1 shows students' ethnic backgrounds and the schools' free and reduced lunch data.

Table 1
Elementary (K–5) Students' Descriptive Statistics

Gender						Free/
				African	Asian	reduced
Male	Female	Caucasian	Hispanic	American	American	lunch
%	%	%	%	%	%	%
51	49	59.6	19.9	9.7	2.9	34.6

Teachers. Teachers from two third grade and two fourth grade classes participated. All four teachers were female and varied in their teaching experiences. A seasoned third grade teacher had been teaching for 15 years, and the other third grade teacher had just begun her second year. Both of the fourth grade teachers had been teaching for 5 years. Although both students and teachers were participants in this study, the students were the target of observation in the research. The four teachers identified as Caucasian ethnic backgrounds.

Procedures

For the first week of the study, the students used pedometers to record their steps from the typical fitness segment only. For the second week of the study, the students participated in mathematics fitness using KIA-style (Hodges, 2015) lessons and wore pedometers recording steps for the fitness segment of the lesson only. At the end of the 2-week implementation, participants took a posttest for the Common Core math concepts. They were also given a postsurvey that assessed their perceptions of the mathematics activities implemented in the fitness segment of their PE classes. Further, a subsample of students participated in short postintervention interviews (in groups of four), and teachers were interviewed in their teaching groups. For the first week, the students completed Regular Jackpot Fitness and took the pretest and presurvey; for the second week, the students completed Math Jackpot Fitness and took the posttest and postsurvey, which we used to determine the differences.

Teachers gave ample instruction during class time prior to this intervention. The third grade students were using the curriculum Engage New York, and the fourth grade students were using both the Engage New York and Singapore Math (Math and Focus) curriculum. The KIA mathematics lessons were station activities that

addressed math concepts, and the lessons involved physical activity done with a partner. They focused on knowledge of healthy behavior (e.g., the difference between moderate and vigorous physical activity and the effects each one has on the heart, and identifying activities that correctly relate to the fitness component) without sacrificing physical activity time within PE classes (Hodges, 2015).

The math fitness intervention combined physical activity and math concepts throughout the duration of fitness. The fitness intervention that we used for the study was the Jackpot Fitness activity in which students work in pairs to complete various exercises. In this activity, different "jackpots" (boxes) are filled with different fitness tasks. One jackpot was filled with a variety of strength exercises (push-ups, sit-ups, squats), the second jackpot contained flexibility exercises (hip bend, quadriceps stretch, straddle stretch), and the third jackpot held cardiorespiratory exercises (carioca, jump rope, jog). These three jackpots thus offered different fitness components that increase health benefits. For regular Jackpot Fitness, the card gave the amount of repetitions the students were to perform (e.g., "Perform 15 jumping jacks"). For Math Jackpot Fitness, each card still had the name of the exercise for the student to perform, but instead included a math problem to find the amount of repetitions (e.g., "Perform 5 × 3 jumping jacks"). Table 2 gives a detailed description on the typical fitness and mathematic fitness activities.

Instruments

Perception surveys. We used a survey to gain a better understanding of the students' perceptions about PE. We used the Subramaniam and Silverman (2000) student attitude toward physical education instrument. Students were given a presurvey before they completed fitness with mathematics; students also completed a postsurvey after they completed mathematics fitness. We used these to track any potential differences. The survey included 12 items. With every statement, the survey gave an example to improve student understanding. The survey items were given on a Likert scale of 1 = *strongly disagree*, 2 = *disagree*, 3 = *uncertain*, 4 = *agree,* and 5 = *strongly agree*. Depending on the question, a 1 and a 5 could both be scored as positive or negative. For example, Question 2 states, "I feel the fitness I learn in my physical education class is useless to

Table 2
Description of the Activities in the Fitness Segments of Physical Education Lessons

Activity	Description
Jackpot Fitness	Students are placed into partners. Three "jackpots" (boxes) are filled with fitness activities. One jackpot is filled with a variety of strength exercises (push-ups, sit-ups, squats), the second jackpot is filled with flexibility exercises (hip bend, quadriceps stretch, straddle stretch), and the third jackpot contains cardiorespiratory exercises (carioca, jump rope, jog). The students begin at one of the jackpots of choice and randomly pick out an activity to perform. Partners take turns selecting a card from one of the three boxes. The students must rotate to a different box each time. The students might repeat an activity, but they cannot consecutively perform an activity, therefore selecting a different card with this in mind is acceptable.
Mathematics Jackpot Fitness	Students are placed into partners. Three "jackpots" (boxes) are filled with fitness activities. One jackpot is filled with a variety of strength exercises (push-ups, sit-ups, squats), the second jackpot is filled with flexibility exercises (hip bend, quadriceps stretch, straddle stretch), and the third jackpot contains cardiorespiratory exercises (carioca, jump rope, jog). Each card has a math problem for the students to quickly solve so that they know how many of each activity to perform, for example, "Perform 8 × 2 jumping jacks." The goal of this fitness is to complete as much exercise as possible while practicing math they are currently working on in the classroom. The students begin at one of the jackpots of choice and randomly pick out an activity to perform. Partners take turns selecting a card from one of the three boxes. The students must rotate to a different box each time. The students might repeat an activity, but they cannot consecutively perform an activity, therefore selecting a different card with this in mind is acceptable.

Note. Modified from *Dynamic Physical Education for Elementary School Children* (p. 161), by R. Pangrazi, 2007, San Francisco, CA: Pearson Benjamin Cummings.

me"; a 5 would be a negative response, and a 1 would be the most positive response. Multiple examples were given and questions from the students were answered during survey administration so that we could check for their understanding.

Common Core mathematics assessment. The pre–post mathematics assessment measured the difference in scores after students practiced math concepts during fitness. Students were given a mathematics assessment; the instrument included 32 items. The classroom teachers told the physical educator what their students were currently being assessed on in math class: addition (e.g., 12 + 18), subtraction (e.g., 19 − 9), division (e.g., 6/3, 4/1), multiplication (e.g., 3×5, 5×1), decimals (e.g., 3.0×10), and skip counting (e.g., 3, 6, 9, ___, 15).

Interviews. We used the interviews to assess the students' overall experience engaging in an interdisciplinary approach of combining mathematics with PE. After the mathematics fitness intervention, one group of four students in each class were interviewed. Both genders were involved in each interview group and were chosen upon asking for volunteers. We chose the number of four students so that we would have a sample from each class while still gaining a variety of responses from all of the selected interviewees. Group interviews were audio recorded and transcribed verbatim. Students were asked questions that compared regular PE class to PE with mathematics. The following questions are a sample of what was asked during the students' interviews: (a) Do you think it's important that you learn about different subjects in physical education? Why? (b) Which do you prefer: regular physical education or physical education with math? Why? Once the participant completed their response, the question was open to any other comments by the participants. Field notes from observations of the students' participation during the fitness segments with and without mathematics activities were also recorded (e.g., how engaged the students were).

We also interviewed the teachers. We interviewed two groups of two teachers about the KIA fitness segments with mathematics concepts and they were asked 10 questions. For example, (a) Do you think mathematics in physical education would be a good idea? Why or why not? (b) What were your students' thoughts of the integration of math into physical education?

Pedometers. Pedometers were crucial in this study, determining whether physical activity remained constant across conditions. Pedometers recorded students' step counts, which we used to determine physical activity patterns during the fitness segments of the lessons. Students were familiar with wearing a pedometer from their regular PE program. They put on and wore the pedometers for the typical fitness segment and then again for KIA mathematics fitness segment and recorded step counts at the end of each fitness segment. Students wore the pedometers for the same amount of time; the same songs were used, which ensured accurate step count data.

Data Analysis

Descriptive statistics were calculated for all variables and by gender (Tables 3 and 4). We analyzed interview data using constant comparison to identify common themes across participants and to compare teachers' and students' perceptions. To explore potential group differences between regular fitness and mathematics fitness for perceptions, steps taken, and mathematics scores, we conducted *t* tests.

Table 3
Descriptive Statistics for the Fitness Mathematics Program

Assessment	*M* (*SD*)	Range
Preperceptions of Math and Physical Education Combined	40.29 (4.00)	31–56
Postperceptions of Math and Physical Education Combined	40.59 (3.08)	33–46
Premathematics Test Score	24.05 (4.90)	9–31
Postmathematics Test Score	25.94 (3.65)	15–31
Step Counts During Fitness Segments		
Regular Fitness	614.51 (286.09)	17–1519
Mathematics Fitness	650.70 (198.08)	310–1176

Table 4
Gender Descriptive Statistics

Gender	Descriptive statistics	Survey		Test		Steps	
		Pre	Post	Pre	Post	Regular	Math
Female	*M*	41.10	41.36	22.80	25.20	571.53	642.77
	SD	2.91	2.67	5.30	3.80	275.47	210.66
	Range	11	10	8–30	15–30	17.0–1156.0	310.0–1176.0
Male	*M*	39.29	39.62	25.70	26.90	668.25	660.63
	SD	4.92	3.34	3.90	3.30	295.83	185.13
	Range	25	13	16–31	15–31	239.0–1519.0	459.0–1078.0

Results

Student Perceptions

Survey. The descriptive results of the surveys pre and post were positive (Table 3). Before the implementation process, fifty-four out of 55 students felt positively about the idea of incorporating mathematics into the fitness portion of PE; after the implementation, all students felt positively about incorporating mathematics into PE. The *t* test for student perceptions showed no significant differences over time, $t(53) = -.60$, $p = .55$; however, there was a slight gender difference, $t(52) = 2.13$, $p = .03$, with girls reporting higher perceptions of math fitness than boys did.

Interview. Some common themes resulted from the interview data. First, students almost unanimously supported including KIA mathematics concepts in the fitness portion of the lesson and believed they were learning more. For example, one fourth grade girl said, "I actually really liked it because it gives us a little more practice out of our regular class." Similarly, a fourth grade boy said, "It's helping us with, like, people that aren't getting, they're having troubles in class, they're learning more out of class too." The third and fourth grade teachers also felt optimistic about the continuing of mathematics into PE.

The second theme was that students enjoyed the challenge of KIA mathematics fitness. Students reported that they liked the fitness portion of the lesson anyway (with music) and that their perceptions were even more positive with mathematics fitness. A third grade boy mentioned, "Sometimes we won't really know the equations and I just really want to learn more." This was also the sentiment from a third grade girl:

> I think that it is a good thing to have that in PE, because it's more challenging and fun and the more challenging it is, the more fun it is and because it's fun when you teach us different things, because then when we're older and we move onto a different grade, we will know more.

When asked about advice they would give to the researchers of this study, both teachers responded with, "Stick to it. Sometimes you are going to feel overwhelmed, but as you get better at it, the kids are going to get better at it." One teacher mentioned, "They absolutely loved the pedometers, they were so excited about the counting and who went the furthest; they were all over that and they did know . . . that was math."

The common theme from all of the third and fourth grade teachers was to keep physical activity as the primary objective but to continue the implementation of other subject areas. One teacher stated, "Make sure that you don't take away anything you're doing now, because I think for you, all you can do is add. I think the kids love it, we love it. Whenever we're out there, we're watching you, it's awesome." Field notes supported teacher and student perceptions, such as "The students seem really engaged. They seem to work better with their partners because they need to rely more on each other for not just the exercise, but the math knowledge"; "The students look like they are really enjoying the challenge and they begin the exercise quickly after the problem is solved"; and "Students run up and feel comfortable asking questions regarding the math problems."

Physical Activity

Table 3 shows descriptive statistics for fitness and mathematics fitness segment groups for steps taken. The *t* test for differences in steps taken as measured with pedometers showed no significant

differences between groups, $t(53) = 1.08$, $p = .29$, which was the desired outcome.

Mathematics Knowledge

The *t* test for differences in mathematics knowledge showed significant differences between conditions, $t(53) = -4.20$, $p < .01$. This result revealed improvement in student learning outcomes based on the KIA mathematics fitness segments.

Discussion

The Becoming One study was different than the Reed et al. (2010)study because we incorporated mathematics into PE rather than physical activity into mathematics; however, the results of interdisciplinary/cross-curricular teaching was significantly positive in both studies. There is something special about how PE and the Common Core, more specifically, mathematics, work together. Although the two sound like they could be on opposite sides of the learning spectrum, both can become one, to increase students' academic achievement. The students had positive experiences with the integration lessons because the learning was meaningful to them. Some students during the Becoming One interviews went on to explain that they learned the mathematics better when moving.

Hatch and Smith (2013) reported student enjoyment during transition away from the traditional classroom environment (p. 49). The researchers described that something abstract was made real to the students so that they could better understand concepts. One student wrote, "I actually understand a little more physics through this project" (Hatch & Smith, 2013, p. 49).

Peters et al. (2012) also incorporated math; the difference was that math consumed more of the lesson time in the Peters et al. study and physical activity consumed more of the lesson time in the Becoming One study. The students from the Peters et al. study learned a lot about math conversions in one lesson; teaching all of the conversions information in one lesson while keeping physical activity as the first priority would be difficult. However, modifications in the length of the conversions unit and/or modifications to the amount of mathematics content taught could allow for more physical activity time. Furthermore, we agree with Peters et al. (2012) that "there is great potential to address other strands of mathematics within all

learning areas," especially in PE (Peters et al., 2012, p. 27). Both studies were successful in improving mathematics knowledge; however, this study kept physical activity as the main priority in the fitness segment of a four-part PE lesson.

Implications for Practice

KIA fitness with mathematics fitness done during the fitness portion of a PE lesson was successful with the population of third and fourth grade students. However, it will be important for researchers to study KIA activities and mathematics with different samples of students, across grade levels and across contexts. Further studies of mathematics implementation into PE will continue to benefit the literature base and field.

One important lesson learned was for the PE teacher to talk to the classroom teachers and see what the students are learning during the time of the implementation; this will ensure usefulness in other subject areas (without taking away from physical activity concepts). Students could have had a negative experience if the PE teacher had not communicated with the classroom teacher before implementation or a partnership. Making sure that as a teacher, you are available at all times is also key, because the students had questions. When the problem was explained, the students seemed more open to the mathematics implementation because they knew the teacher was there to help. One limitation of the study was the lack of a comparison group (since students also had mathematics in the classroom). However, students and teachers reported improved knowledge outcomes from the KIA mathematics fitness lessons, which supported the credibility and trustworthiness of the findings. Two fourth grade teachers shared the usefulness of having the mathematics assessment data, noting that it is important that students "show growth in their learning" and "that they've learned the expectation that [the teacher] would have" as the objective.

The pedometers encouraged the students to be active during the mathematics fitness, because not only were they trying to solve a mathematics equation, but they also wanted a high number reading. Using pedometers during the mathematics fitness was essential for keeping the students active, because they were being held accountable at all times during the KIA fitness portion of the lesson. Another

aid in physical activity was the music played; the music was upbeat, which appeared to create positive feelings toward PE under both conditions. Last, the fitness activity card would normally give a number for the amount of repetitions for students to perform an exercise, but modifying the numbers to equations was an enjoyable task.

Conclusions

Overall, the KIA fitness mathematics model was more positive than expected; the students responded positively through surveys and interviews, had significant improvements in mathematics knowledge scores, and maintained similar step counts during the fitness lesson segments. Although every class and school environment is different, mathematics fitness may be worth trying because of the benefits that could occur for student learning in PE and mathematics. With the use of pedometers and assessments, teachers can formulate the outcomes of lessons in terms of physical activity and mathematics knowledge.

References

DeFrancesco, C., & Casas, B. (2013). Elementary physical education and math skill development. *Strategies, 18*(2), 21–23. https://doi.org/10.1080/08924562.2004.10591122

Hatch, G., & Smith, D. (2013). Integrating physical education, math, and physics. *Journal of Physical Education, Recreation, and Dance, 75*(1), 42–50. https://doi.org/10.1080/07303084.2004.10608541

Hodges, M. (2015). An innovative strategy for teaching health-related fitness knowledge in elementary physical education classes. *Strategies*, *28*(4), 19–25. https://doi.org/10.1080/08924562.2015.1044145

Pangrazi R. P. (2007). *Dynamic physical education for elementary school children* (15th ed.). San Francisco, CA: Pearson Benjamin Cummings.

Peters, C., Geiger, V., Goos, M., & Dole, S. (2012). Numeracy in health and physical education. *Australian Mathematics Teacher, 68*(1), 21–27.

Phillips, S., & Marttinen, R. (2013). Physical education and math: The perfect couple. *New Zealand Physical Educator, 46*(3), 20–23.

Reed, J. A., Einstein, G., Hahn, E., Hooker, S. P., Gross, V. P., & Kravitz, J. (2010). Examining the impact of integrating physical activity on fluid intelligence and academic performance in an elementary school setting: A preliminary investigation. *Journal of Physical Activity and Health, 7,* 343–351.

Scrabis-Fletcher, K. (2016). Integrating common core content into physical education: Creating new knowledge connections. *Journal of Physical Education, Recreation, and Dance, 87*(7), 20–26. https://doi.org/10.1080/07303084.2016.1202797

Subramaniam, P., & Silverman, S. (2000). Validation of scores from an instrument assessing student attitude toward physical education. *Measurement in Physical Education and Exercise Science, 4*, 29–43. https://doi.org/10.1207/S15327841Mpee0401_4

Usnick, V., Johnson, R. L., & White, N. (2003). Connecting physical education and math. *Teaching Elementary Physical Education, 14*(4), 20–23.

Wade, M. (2016). Math and movement: Practical ways to incorporate math into physical education. *Strategies, 29*(1), 10–15. https://doi.org/10.1080/08924562.2015.1111788

Wright, R. J. (2009). Methods for improving test scores: The good, the bad, and the ugly. *Kappa Delta Pi Record, 45*(3), 116–121. https://doi.org/10.1080/00228958.2009.10517300

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MIDDLE SCHOOL INTRAMURALS

Importance of Bonding in Middle School Intramural Sports Participation: Psychosocial Outcomes Based on Gender and Grade-Level Differences

Joy Pantzer, Catherine E. Dorwart, Andrea Woodson-Smith

Abstract

This study aimed to measure perceived psychosocial outcomes of middle school intramural participants in psychological development, social development, and school connectedness and to identify differences between gender and grade level. One hundred four middle school students were surveyed via a modified version of the Social Outcomes questionnaire. Data revealed that students perceived the highest degrees of outcomes in the areas of bonding with teammates, improving ability to work with a team, and increased feelings of belonging at school. ANOVAs and t tests showed whether there were significant differences between groups based on grade level. No differences were found based on gender. Results from this exploratory study support the importance of providing inclusive intramural programs for middle school students that enhance not only physical health, but also psychological and social health.

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Schools are considered one of the most critical organizations for providing youth with the opportunity for and education about the importance of physical activity (PA). The Centers for Disease Control and Prevention (CDC, 2014a) has reported that the obesity rate in children has more than doubled and adolescent rates have quadrupled over the past 30 years. Despite this alarming increase, the quantity and quality of class time in physical education has decreased due to budget cuts, time constraints, inappropriate class sizes, and physical education not being considered a priority (CDC, 2010, 2014b; Elder et al., 2007). Statistics show that in 2006 only 3.8% of elementary schools, 7.9% of middle schools, and 2.1% of high schools provided the recommended daily allotment of physical education for students (CDC, 2013). This has caused many governing agencies to advocate for Comprehensive School Physical Activity Programs (CSPAP) that offer physical activity opportunities before, during, and after school (CDC, 2013). Intramural sports have been identified as one inclusive component of CSPAPs for increasing PA levels (National Association for Sport and Physical Education [NASPE], 2008).

Intramural programs have declined in recent years (McEwin & Swaim, 2009), while more exclusive, interscholastic sports have risen in number and are heavily favored by middle schools (Elder et al., 2007; Mull, Bayless, & Jamieson, 2005), despite the programs' high financial costs and research indicating intramurals are more aligned with the philosophy and purposes of middle schools (NASPE, 2008). Even though many students desire to participate in interscholastic sports, they are often excluded because they lack the skill, eligibility, or resources required to participate. Students who are "unable to make an athletic team find themselves with few opportunities to participate in [organized] sport" (Mull et al., 2005, p. 20) in the community too, because of a lack of recreational programs for adolescents between the ages of 13 and 15. Furthermore, sixth grade students are often automatically excluded from interscholastic sports due to school policy (Kanters, Bocarro, Edwards, Casper, & Myron, 2013). However, providing PA opportunities for middle schoolers is crucial, as PA levels tend to drop around this time (Nader, Bradley, Houtus, McRitchie, & O'Brien, 2008).

Recent studies have shown well-documented physical benefits of middle school intramural participation, including increased PA

for students (Bocarro, Kanters, Edwards, Casper, & McKenzie, 2014; Kanters et al., 2013), increased participant rates (Edwards, Kanters, & Bocarro, 2014), increased energy expenditure (Edwards et al., 2014), and improved motor skills (NASPE, 2002). However, few studies have tried to determine whether middle school intramural participants experience psychological and social benefits, even though psychosocial needs of middle school students are unique and well documented (NASPE, 2008). Furthermore, studies focused on older students (Artinger et al., 2006; Sturts & Ross, 2013) have indicated that those in college benefit socially and personally from intramural participation. Sturts and Ross (2013) reported specific benefits of college intramural participation including development in areas of "social interaction, time management, ability to work within a team, overall happiness, sense of belonging, and feelings of self-worth" (p. 26), along with greater success and satisfaction with college.

Compared to students of other age groups, middle school students tend to demonstrate a greater attraction to their peers, a strong need to belong, and the need to feel connected to school (Caskey & Anfara, 2007; Day, Hamm, Lambert, & Farmer, 2014; NASPE, 2008). Participation in intramural sports programs can provide for some of these needs by offering students more opportunities to develop positive peer relationships, enhance self-esteem, create better relationships with teachers, and form a sense of belonging within their teams. In addition, participation in team sports can enhance self-concept, particularly in middle school girls (Ference & Muth, 2004). These factors can lead to more positive school experiences. The need for positive school experiences is great, considering nearly half of students are already disengaged from school by the time they start high school (Sulkowski, Demaray, & Lazarus, 2012). Though few studies have tried to determine how intramurals affect students' psychological and social development, studies (Bloomfield & Barber, 2010; Bowker, Gadbois, & Cornock, 2003; Eime, Young, Harvey, Charity, & Payne, 2013; Fredricks & Eccles, 2006; Kort-Butler, 2012; Kort-Butler & Hagewen, 2011; Taylor & Turek, 2010) have shown that extracurricular participation in sports and other activities can positively affect self-esteem, social interactions, and sense of school connectedness.

High self-esteem is a critical element for the overall health of middle school students and provides resiliency against stressful

situations and potential life problems such as depression, dissatisfaction, and other aggressive and self-harming behaviors (Kort-Butler & Hagewen, 2011). Involvement in structured, school-based extracurricular activities allows students a safe and supportive social environment in which to build skills, establish relationships, and explore and develop identity (Kort-Butler, 2012), which can help form the foundation for their self-esteem at this crucial developmental age. Kort-Butler and Hagewen (2011) found that students involved in extracurricular activities, including sports, had a higher level of self-esteem at the age of 14 than did those who did not participate.

Extracurricular activities also provide a safe social setting in which students can develop social skills and establish peer group identification. They provide frequent chances for students to interact informally with peers who have common interests (Daley & Leahy, 2003), which can lead to greater confidence in their ability to interact with peers and make new friends (Daley & Leahy, 2003; Eccles, Barber, Stone, & Hunt, 2003; Eime et al., 2013). Students form not only peer networks through extracurricular activities, but also positive relationships with pro-social adults who supervise activities, coach, and support the team (Eccles et al., 2003; Eime et al., 2013). This can lead to increased connectedness to school, gives students the opportunity to belong to a socially valued group, and helps them develop positive relationships with supportive and positive peers and adults (Kort-Butler, 2012). Kort-Butler (2012) concluded that such involvement gives students avenues to find meaningful ways to belong to and give back to their communities, which can lead to enhanced social functioning, academic achievement, and school connectedness in short- and long-term outcomes.

The growing interest in the importance of students feeling connected to and satisfied with their school experience is rooted in disturbing statistics presented by Klem and Connell (2004), who note that "by high school as many as 40–60% of students are chronically disengaged from school . . . not counting those who have already dropped out" (p. 262). Loukas, Ripperger-Suhler, and Horton (2009) further noted that school connectedness during middle school may more easily be undermined because of physical, mental, and social changes that students experience. Higher extracurricular activity participation rates were one of four school characteristics associated

with higher levels of school connectedness (Daly, Buchanan, Dasck, Eichen, & Lenhart, 2010; McNeely, Nonnemaker, & Blum 2002). Research has also shown that PA during and after school hours is correlated with satisfaction with school (Trudeau & Shephard, 2008). Despite the body of research that suggests that participation in extracurricular activities can lead to greater school connectedness in the short and long term, programs consistently get cut due to budgetary constraints and an overwhelming focus on academic core classes.

The integral role that extracurricular activity participation plays in psychological and social development is evident throughout research (Bloomfield & Barber, 2010; Eime et al., 2013; Fredricks & Eccles, 2006; Kort-Butler & Hagewen, 2011; Tracy & Erkut, 2002). Because these finding are generalized to extracurricular participation in a variety of activities (including clubs, sports, performing arts, etc.), more research needs to identify and describe the *specific* outcomes of intramural sports participation on the psychosocial development of middle school students. Though researchers have begun to investigate the benefits of intramural programs on middle school participants' PA levels (Bocarro et al., 2014; Edwards et al., 2014; Kanters et al., 2013), they need to explore how these programs may support students' psychosocial development and school connectedness.

Therefore, this study (1) measured the perception of psychosocial outcomes of middle school intramural participants in psychological, social, and school connectedness areas and (2) examined differences in psychosocial outcomes between genders and grade levels.

Method

Participants

The participants in this study (n = 104) were middle school students (Grades 6–8, ages 10–15 years) from three public middle schools in North Carolina. All three schools provided intramural sports programs. Students volunteered to participate in the after-school intramural sports programs. Research procedures were approved by the university institutional review board, the school district, and the schools' principals prior to the beginning of research. To participate, students were required to return parental consent forms and assent forms.

Instrumentation

The instrument used in this study was based on the social benefits questionnaire that Artinger et al. (2006) developed and implemented to measure the social benefits of intramural sports for college students. Participants' level of agreement with each social benefits statement was measured on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). For the purposes of this study, the social benefits questionnaire was modified and revised. The language of the questionnaire was adjusted to the level of middle school students' understanding and general vocabulary. Three of the five sections of the survey were used and renamed. The *school connectedness* section measured whether respondents perceived that participation improved their sense of belonging to and satisfaction with school. The *psychological benefits* measured development of self-esteem and happiness. The *social group bonding* section measured whether respondents perceived that intramural participation improved relationships and social interactions. The questionnaire after modifications included 15 questions measured by the same Likert scale that Artinger et al. (2006) used and included six demographic questions including the participants' gender and grade level.

Because of the modifications to the original instrument, a pilot study was conducted before the survey was administered, and this determined reliability and unclear wording of the survey questions. In previous studies, the internal consistency for the overall questionnaire was established as reliable with a Cronbach's alpha coefficient of 0.887 (Artinger et al., 2006; Sturts & Ross, 2013). Similar to results in previous studies, the results of the pilot study were analyzed, and the overall instrument was found to be reliable with a Cronbach's alpha value of 0.79, $p < .05$.

Procedures

On the last day of participation in intramural programs, students who returned consent and assent forms completed the modified social benefits questionnaire according to their experiences in the intramural program and psychosocial outcomes experienced. The test administrator explained the procedures for completing the survey and answered any questions that students had, to clarify points of confusion. Surveys took approximately 10 min to complete. Data

were tabulated and analyzed, and the psychosocial outcomes of participation in middle school intramural programs were determined.

Design and Analysis

The data from the modified social benefits questionnaire was tabulated separately in two sections: demographics and social outcomes. Frequency values were calculated for demographics, and mean, mode, and standard deviation were calculated for each psychosocial benefits statement and subscale. An independent-samples *t* test explored the differences between psychosocial outcomes in male and female students. A Pearson correlation determined whether there were significant relationships in outcomes among students of different grade levels. A one-way ANOVA determined whether there were differences between psychosocial outcomes and grade level.

Results

The first section of the survey consisted of demographic information. Mean, mode, standard deviation, and frequency values were calculated from the 104 usable surveys, which provided a better understanding of the gender, age, race/ethnicity, and grade level of the participants. Of the 104 respondents, 63 were male (61%) and 41 were female (39%). The sample was predominantly White/Caucasian (78%), with the next largest group being Black/African American (13%). The mean age of respondents was 12.20 years. The respondents' ages ranged from 10 to 15 with the majority of respondents ranging from ages 11 to 13 (92%). Respondents also reported their grade level. The greatest proportion of respondents were sixth grade students (42%), with participation decreasing as grade level increased. Table 1 summarizes gender and grade-level statistics.

Table 1
Descriptive Statistics of Respondents

Variable	Frequency	%
Gender		
Male	63	60.6
Female	41	39.4
Grade Level		
6th	44	42.7
7th	34	33.0
8th	25	24.3

The second section of the survey consisted of 15 Likert-type statements about perceived psychosocial benefits gained from intramural participation. The mean, standard deviation, and mode for responses to each statement and each subscale were calculated. Overall, participants' responses demonstrated the greatest benefits in the area of social benefits ($M = 4.24$, $SD = .635$) and similar results in psychological ($M = 3.95$, $SD = .577$) and school connectedness ($M = 3.95$, $SD = .728$) outcome subscales. Statements with the highest reported benefits were in the social outcomes category and included "allows me to bond with my teammates" ($M = 4.48$, $SD = .776$) and "improves my ability to work within a team" ($M = 4.37$, $SD = .904$) and in the school connectedness category for "improves my feeling of belonging at school" ($M = 4.28$, $SD = 1.028$). Table 2 presents the values of individual statements and subscales.

Table 2
Values of Mean, Mode, and Standard Deviation for Psychosocial Benefits

Psychosocial benefit	*M*	*SD*	Mode
Psychological Benefits			
1: Improves my leadership abilities	3.69	.893	4
4: Helps me to understand myself better[a]	4.05	1.046	5
7: Improves my overall happiness	4.00	.828	4
10: Improves my self-confidence[a]	4.21	.956	5
13: Increases my feeling of self-worth	3.83	.945	3
Psychological Subscale	3.95	.577	4.2
School Connectedness Benefits			
3: Improves my feeling of belonging at school[a]	4.28	1.028	5
6: Increases my satisfaction with my school experience[a]	3.91	1.189	5
9: Improves my sense of responsibility to my school	3.60	1.013	3
11: Increases involvement in school extracurricular activities	4.03	1.136	5
School Connectedness Subscale	3.95	.728	4

Table 2 (cont.)

Psychosocial benefit	*M*	*SD*	Mode
Social Group Bonding Benefits			
2: Helps me feel closer to adults and kids at school	4.17	.781	4
5: Improves my social relationships at school	4.13	.972	5
8: Improves my ability to work within a team[a]	4.37	.904	5
12: Increases social bonding and support from peers[a]	4.05	1.158	5
14: Improves my ability to interact socially[a]	4.26	1.009	5
15: Allows me to bond with my teammates	4.48	.776	5
Social Bonding Subscale	4.24	.635	4.5

[a]Statement with reverse coding.

An independent-samples *t* test determined whether there were significant differences in perceived psychosocial outcomes based on the group variable of gender. No significant differences were found between males and females in the three subscales or with any of the 15 individual statements.

Females reported higher degrees of psychosocial outcomes than males in all three subscales and reported higher degrees of psychosocial outcomes on 10 of 15 statements, including four of four school connectedness outcomes, four of six social bonding outcomes, and two of five psychological outcomes. Table 3 summarizes statement and subscale response calculations based on gender.

A one-way ANOVA examined whether there were significant differences between grade-level and psychosocial outcomes. The only significant difference was with Statement 14. Sixth graders reported experiencing a higher degree of improvement in their ability to interact socially than did eighth graders, $F(2) = 3.237$, $p < .05$. Table 4 provides significant difference results by grade level.

Table 3
Statement and Subscale Responses Based on Gender

Psychosocial benefit	Gender	*M*	*SD*
Psychological Benefits			
1: Improves my leadership abilities	Male	3.70	.909
	Female	3.68	.879
4: Helps me to understand myself better[a]	Male	3.94	1.091
	Female	4.22	.962
7: Improves my overall happiness	Male	4.06	.866
	Female	3.90	.768
10: Improves my self-confidence[a]	Male	4.26	.940
	Female	4.15	.989
13: Increases my feeling of self-worth	Male	3.81	1.022
	Female	3.88	.822
Psychological Subscale	Male	3.95	.633
	Female	3.96	.489
School Connectedness Benefits			
3: Improves my feeling of belonging at school[a]	Male	4.22	1.069
	Female	4.37	.968
6: Increases my satisfaction with my school experience[a]	Male	3.79	1.217
	Female	4.10	1.136
9: Improves my sense of responsibility to my school	Male	3.55	1.066
	Female	3.68	.934
11: Increases my involvement in school-based extracurricular activities	Male	4.02	1.100
	Female	4.05	1.203
School Connectedness Subscale	Male	3.89	.766
	Female	4.05	.661

Table 3 (cont.)

Psychosocial benefit	Gender	*M*	*SD*
Social Group Bonding Benefits			
2: Helps me feel closer to adults and kids at school	Male	4.06	.801
	Female	4.34	.728
5: Improves my social relationships at school	Male	4.08	.938
	Female	4.20	1.030
8: Improves my ability to work within a team[a]	Male	4.46	.820
	Female	4.22	1.013
12: Increases social bonding and support from peers[a]	Male	4.10	1.187
	Female	3.98	1.121
14: Improves my ability to interact socially[a]	Male	4.17	1.086
	Female	4.40	.871
15: Allows me to bond with my teammates	Male	4.41	.854
	Female	4.59	.631
Social Group Bonding Subscale	Male	4.21	.663
	Female	4.29	.593

[a]Statement with reverse coding.

Table 4

Differences in Psychosocial Outcomes and Grade Level

				M	
Psychosocial outcome	***df***	***F***	**Sig.**	**6th grade**	**8th grade**
14: Improved my ability to interact socially[a]	99	3.237**	.043	4.53	3.92

Note. A Pearson correlation was also performed to compare grade levels.

[a]Statement with reverse coding.

**$p < .05$.

A significant negative relationship was found between grade level and improving feeling of belonging at school ($r = -.209$, $p < .05$), grade level and improving self-confidence ($r = -.197$, $p < .05$), and grade level and improving ability to interact socially ($r = -.247$, $p < .05$). Table 5 shows the results of significant Pearson correlations.

Table 5

Significant Relationships in Psychosocial Outcomes and Grade Level

Variable	Significance	Grade level	Statement
Statement 3: Improves my feeling of belonging at school (reverse-coded statement)			
Grade level	Pearson Correlation	1	-.209*
	Sig. (2-tailed)		.034
Statement 3	Pearson Correlation	-.209*	1
	Sig. (2-tailed)	.034	
Statement 10: Improves my self-confidence (reverse-coded statement)			
Grade Level	Pearson Correlation	1	-.197*
	Sig. (2-tailed)		.047
Statement 10	Pearson Correlation	-.197*	1
	Sig. (2-tailed)	.047	
Statement 14: Improves my ability to interact socially			
Grade Level	Pearson Correlation	1	-.247*
	Sig. (2-tailed)		
Statement 14 Recode	Pearson Correlation	-.247*	1
	Sig. (2-tailed)	.012	

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

Social benefits decreased based on grade level for the survey subscales and nine of 15 benefits including four of six social benefits, three of four school connectedness benefits, and two of five psychological benefits. Sixth graders reported higher degrees of psychosocial benefits than seventh and eighth graders. Seventh graders reported higher benefits than eighth graders. Table 6 summarizes statement and subscale calculations based on grade level.

Table 6

Statement and Subscale Responses Based on Grade Level

Psychosocial benefit	Grade	*M*	*SD*
Psychological Benefits			
1: Improves my leadership abilities	6th	3.80	.795
	7th	3.44	.960
	8th	3.84	.943
4: Helps me to understand myself better[a]	6th	4.18	.971
	7th	4.00	1.073
	8th	3.88	1.166
7: Improves my overall happiness	6th	3.95	.950
	7th	4.03	.758
	8th	4.00	.707
10: Improves my self-confidence[a]	6th	4.40	.791
	7th	4.18	.999
	8th	3.92	1.115
13: Increases my feeling of self-worth	6th	3.88	.981
	7th	3.94	.919
	8th	3.54	.884
Psychological Subscale	6th	4.05	.489
	7th	3.92	.681
	8th	3.82	.544
School Connectedness Benefits			
3: Improves my feeling of belonging at school[a]	6th	4.50	.792
	7th	4.24	1.046
	8th	3.96	1.306
6: Increases my satisfaction with my school experience[a]	6th	3.88	1.276
	7th	4.00	1.155
	8th	3.96	.978
9: Improves my sense of responsibility to my school	6th	3.77	.937
	7th	3.42	1.146
	8th	3.48	.918
11: Increases my involvement in school-based extracurricular activities	6th	4.07	1.189
	7th	4.00	1.128
	8th	4.00	1.118
School Connectedness Subscale	6th	4.05	.687
	7th	3.91	.812
	8th	3.85	.692

Table 6 (cont.)

Psychosocial benefit	Grade	*M*	*SD*
Social Group Bonding Benefits			
2: Helps me feel closer to adults and kids at school	6th	4.23	.774
	7th	4.12	.880
	8th	4.16	.688
5: Improves my social relationships at school	6th	4.30	.904
	7th	4.00	1.073
	8th	4.00	.957
8: Improves my ability to work within a team[a]	6th	4.50	.731
	7th	4.38	.985
	8th	4.08	1.038
12: Increases social bonding and support from peers[a]	6th	4.00	1.201
	7th	4.21	1.149
	8th	3.88	1.116
14: Improves my ability to interact socially[a]	6th	4.53	.767
	7th	4.18	1.167
	8th	3.92	1.077
15: Allows me to bond with my teammates	6th	4.45	.697
	7th	4.47	.929
	8th	4.52	.714
Social Group Bonding Subscale	6th	4.33	.555
	7th	4.23	.742
	8th	4.10	.618

[a]Statement with reverse coding.

Discussion

Participants reported many psychosocial benefits of intramural participation, such as improvement in self-confidence, social interactions, and social bonding, that are consistent with research about the psychosocial benefits of participation in sport for young people (Eime et al., 2013; Kort-Butler, 2012). Degrees of outcomes reported showed that the sample perceived the most benefit in the area of social bonding outcomes. These results are consistent with middle school students' unique stage of social development. Social

relationships are a priority for students at this age, as they to seek to learn in active ways and interact with peers while doing so (Caskey & Anfara, 2007; NASPE, 2002). An emphasis on the social benefits for middle school students was confirmed with three of the four highest reported benefit statements belonging to the social bonding outcome subscale. This highlights the importance of understanding and promoting not only the physical benefits of intramural sports participation (Bocarro et al., 2014; Edwards et al., 2014; Kanters et al., 2013), but also the social benefits of participation (Bloomfield & Barber, 2010; Eime et al., 2013).

Perceived psychosocial outcomes varied among groups based on gender and grade level. Although no significant differences were found between genders, girls had higher means than boys in four of six social statements and four of four school connectedness statements. This is consistent with research that suggests that girls value the relational and connection benefits that come from sports participation (Bowker et al., 2003; Ference & Muth, 2004; Taylor & Turek, 2010). Boys had higher means than girls in three of four psychological outcome statements, noting gains in leadership, happiness, and self-confidence, consistent with research reporting positive associations between masculinity and athletic/physical competence and self-worth (Tracy & Erkut, 2002). This may indicate that boys tend to place more value on societal expectations of sport participation and rely on it for part of their identity (Tracy & Erkut, 2002).

Though female students reported higher gains from intramural participation in most areas, female participation rates are still much lower than male rates. This should motivate schools to design more intramural programs that attract female students. Bowker et al. (2003) emphasized the importance of providing opportunities that are more recreational and less competitive for individuals with a feminine gender role orientation. Bocarro et al. (2014) recommended gender-specific intramural programs that allow girls to participate in settings where boys are less likely to dominate.

Regarding grade level, sixth grade students reported higher degrees of social outcomes than seventh and eighth grade students in nine out of 15 psychosocial statements, especially in the area of social bonding and school connectedness. This may be because sixth grade students are not allowed to participate in interscholastic

school sports per state policy (Kanters et al., 2013) and are seeking ways to be more involved in meaningful ways at school. Kanters et al. (2013) noted the importance of providing opportunities for sixth grade students to participate in sports, as PA and participation levels on teams tend to decrease during the beginning of middle school (Nader et al., 2008). Furthermore, research shows a major transition that happens in the sixth grade and that may disrupt previous social connections for students (Day et al., 2014). Intramural participation may provide students with nonthreatening opportunities to establish strong relationships with prosocial adults and peers, increase social interactions outside of the classroom (Caskey & Anfara, 2007; NASPE, 2002), and fulfill their desire for belonging as they transition to middle school. This may explain the significant difference that was also found between sixth graders and eighth graders, with sixth graders reporting greater improvement in their ability to interact socially, and the negative correlation found between grade level and the statements of feeling of belonging at school, improvement in self-confidence, and improvement in ability to socially interact.

Implications for Practice

Few schools offer intramural programs and most only offer interscholastic sports, which are less inclusive. Students can experience not only physical benefits from intramural participation, but also, as the results from this study suggest, improvements in self-esteem, improvements in their ability to socially interact, and feelings of belonging at school. These factors can help make middle schoolers' experiences positive and can contribute to their overall development. Based on these findings, schools and school systems may begin to explore ways to actively increase the quantity and quality of intramural programs in middle schools.

The results of this study also suggest that these particular middle school girls perceived greater psychosocial benefits than boys in many areas surveyed. Despite the greater reported benefits, girls' participation rates in intramurals are traditionally much lower than boys'. This has the potential to motivate intramural directors to design programs that will increase female participation and to focus on retention of girls who are already participating. This may

encourage girls' overall development and general happiness at school. A focus on increasing the participation and retention of girls may also require exploring the possibility of separating some programs by gender, while continuing to include some co-ed programs as well, for intramural directors to determine influences on female participation rates and the degree of benefits gained.

Consistent with the findings of this study, intramural directors should also seek to continue to develop intramural programs (within these schools) that attract and target students from all grade levels. Findings showed that sixth graders participated more and reported higher benefits than seventh and eighth graders in most areas. Although this could partially be due to sixth graders ineligibility to participate on other sports teams during their first year of school, it may also be related to the tendency for youth to decrease participation in physical activities as their age increases. With this in mind, schools should continue to offer intramural programs to sixth graders while concurrently designing other programs that are more attractive to seventh and eighth graders. In so doing, they will help older students to maintain their activity levels and to reap psychosocial benefits. This may require intramural directors to poll students from each grade level to determine differences in the types of activities desired according to grade level. It would also be advisable for schools to experiment with restricting some activities to specific grade levels, to determine if participation or benefits increased when students participated strictly with peers from their grade level.

The findings from this study provide several implications for intramural directors, principals, and school policy makers regarding the role of intramural sports on the middle school level. Consistently high-perceived psychosocial outcomes by participants suggest that intramural participation may be positively affecting various psychological, social, and school connectedness factors including improving students' self-esteem, social interactions, and sense of belonging at school. The results of this study contribute to the body of knowledge about the benefits of intramural sports for middle school students and may influence the direction of future research, which could offer additional information about the value of intramural programs and how participation affects middle school students.

Limitations

The results of this study should not necessarily be applied to the entire population of middle school intramural participants. The respondents in the sample were predominantly White and male, and a larger portion were sixth graders. To increase the applicability of results, future research could survey a larger, more diverse sample.

Future Research

Researchers should continue to explore the psychosocial outcomes of middle school intramural participation by comparing intramural participant psychosocial outcomes to nonparticipant outcomes, examining whether the types (i.e., team sports vs. individual sports) and amounts of programs participated in significantly affect outcomes, determining benefits experienced based on ethnicity, and comparing benefits gained from intramural participation with interscholastic sports participation. These directions could provide more concrete knowledge about whether intramurals significantly affect students' psychosocial outcomes, and they may influence the creation of more intramural sports programs in middle schools and affect overall policy.

In conclusion, few studies have examined the perceived psychosocial outcomes of intramural participation for middle school students. Though physical outcomes of intramural participation for middle school students have been studied (Edwards et al., 2014; Kanters et al., 2013) and social outcomes for college students have been examined (Artinger et al., 2006; Sturts & Ross, 2013), research needs to determine whether intramural participation can benefit middle school students in the areas of self-esteem, social interactions, and school connectedness. Examining outcomes related to intramural participation and middle school students' psychosocial outcomes may be crucial for contributing to overall development of students and helping them feel more connected at school.

References

Artinger, L., Clapham, L., Hunt, C., Meigs, M., Milord, N., Sampson, B., & Forrester, S. A. (2006). The social benefits of intramural sports. *NASPA Journal, 43,* 69–86. https://doi.org/10.2202/0027-6014.1572

Bloomfield, C., & Barber, B. (2010). Australian adolescents' extracurricular activity participation and positive development: Is the relationship mediated by peer attributes? *Australian Journal of Educational and Developmental Psychology, 10,* 108–122.

Bocarro, J., Kanters, M., Edwards, M., Casper, J., & McKenzie, T. (2014). Prioritizing school intramural and interscholastic programs based on observed physical activity. *American Journal of Health Promotion, 28,* S65–S71. https://doi.org/10.4278/ajhp.130430-QUAN-205

Bowker, A., Gadbois, S., & Cornock, B. (2003). Sports participation and self-esteem as a function of gender and gender role orientation. *Sex Roles, 49,* 47–58. https://doi.org/10.1023/A:1023909619409

Caskey, M. M., & Anfara, V. A., Jr. (2007). Research summary: Young adolescents' developmental characteristics. Retrieved March 12, 2016, from http://www.nmsa.org/Research/ResearchSummaries DevelopmentalCharacteristics/tabid/1414/Default.aspx

Centers for Disease Control and Prevention. (2010). *The association between school-based physical activity, including physical education, and academic performance.* Atlanta, GA: U.S. Department of Health and Human Services.

Centers for Disease Control and Prevention. (2013*). Comprehensive school physical activity programs: A guide for schools.* Atlanta, GA: U.S. Department of Health and Human Services.

Centers for Disease Control and Prevention. (2014a). *Childhood obesity facts.* Retrieved from http://www.cdc.gov/healthyyouth/obesity/facts.htm

Centers for Disease Control and Prevention. (2014b). *Physical activity facts.* Retrieved from http://www.cdc.gov/healthyyouth/physicalactivity/facts.htm

Daley, A. J., & Leahy, J. (2003) Self-perceptions and participation in extra-curricular physical activities. *Physical Educator, 60,* 13–19.

Daly, B., Buchanan, C., Dasck, K., Eichen, D., & Lenhart, C. (2010). Promoting school connectedness among urban youth of color: Reducing risk factors while promoting protective factors. *Prevention Researcher, 17,* 18–20.

Day, K., Hamm, J., Lambert, K., & Farmer, T. (2014). Social integration and students' perceptions of the transition to middle school. *Journal of Educational and Developmental Psychology, 4,* 10–26.

Eccles, J. S., Barber, B. L., Stone, M., & Hunt, J. (2003). Extracurricular activities and adolescent development. *Journal of Social Issues, 59,* 865–889. https://doi.org/10.1046/j.0022-4537.2003.00095.x

Edwards, M. B., Kanters, M. A., & Bocarro, J. N. (2014). Policy changes to implement intramural sports in North Carolina middle schools: Simulated effects on sports participation rates and physical activity intensity, 2008–2009. *Preventing Chronic Disease, 11.* https://doi.org/10.5888/pcd11.130195

Eime, R. M., Young, J. A., Harvey, J. T., Charity, M. J., & Payne, W. R. (2013). A systematic review of the psychological and social benefits of participation in sport for children and adolescents: Informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity, 10,* 98–118. https://doi.org/10.1186/1479-5868-10-98

Elder, J. P., Felton, G. M., Grieser, M., Johnson, C., Kubik, M. Y., & Lee, J. S. (2007). Policies and opportunities for physical activity in middle school environments. *Journal of School Health, 77,* 41–47. https://doi.org/10.1111/j.1746-1561.2007.00161.x

Ference, R., & Muth, K. (2004). Helping middle school females form a sense of self through team sports and exercise. *Women in Sport and Physical Activity, 13,* 28–35. https://doi.org/10.1123/wspaj.13.1.28

Fredricks, J. A., & Eccles, J. S. (2006). Is extracurricular participation associated with beneficial outcomes? Concurrent and longitudinal relations. *Developmental Psychology, 42,* 698–713. https://doi.org/10.1037/0012-1649.42.4.698

Kanters, M. A., Bocarro, J. N., Edwards, M. B., Casper, J. M., & Myron, F. F. (2013). School sport participation under two school sport policies: Comparisons by race/ethnicity, gender, and socioeconomic status. *Annals of Behavioral Medicine, 45,* S113–S121. https://doi.org/10.1007/s12160-012-9413-2

Klem, A. M., & Connell, J. P. (2004). Relationships matter: Linking teacher support to student engagement and achievement. *Journal of School Health, 74,* 262–273. https://doi.org/ 10.1111/j.1746-1561.2004.tb08283.x

Kort-Butler, L. A. (2012). Extracurricular activity involvement and adolescent self-esteem. *Prevention Researcher, 19,* 13–16.

Kort-Butler, L. A., & Hagewen, K. J. (2011). School-based extracurricular activity involvement and adolescent self-esteem: A growth-curve analysis. *Journal of Youth and Adolescence, 40,* 568–581. https://doi.org/10.1007/s10964-010-9551-4

Loukas, A., Ripperger-Suhler, K. G., & Horton, K. D. (2009). Examining temporal associations between school connectedness and early adolescent adjustment. *Journal of Youth and Adolescence, 38,* 804–812. https://doi.org/10.1007/s10964-008-9312-9

McEwin, C. K., & Swaim, J. (2009). Middle level interscholastic sports programs. Retrieved from http://www.amle.org/BrowsebyTopic/WhatsNew/WNDet.aspx?ArtMID=888&ArticleID=324

McNeely, C. A., Nonnemaker, J. M., & Blum, R. W. (2002). Promoting school connectedness: Evidence from the national longitudinal study of adolescent health. *Journal of School Health, 72,* 138–146. https://doi.org/10.1111/j.1746-1561.2002.tb06533.x

Mull, R. F., Bayless, K. G., & Jamieson, L. M. (2005). *Recreational sport management* (4th ed.). Champaign, IL: Human Kinetics.

Nader, P., Bradley, R., Houtus, R., McRitchie, S., & O'Brien, M. (2008). Moderate-to-vigorous physical activity from ages 9 to 15 years. *Journal of the American Medical Association, 300,* 295–305. https://doi.org/10.1001/jama.300.3.295

National Association for Sport and Physical Education. (2002). *Co-curricular physical activity and sport programs for middle school students [Position paper].* Reston, VA: Author.

National Association for Sport and Physical Education. (2008). *Comprehensive school physical activity programs* [Position statement]. Reston, VA: Author.

Sturts, J. R., & Ross, C. M. (2013). Collegiate intramural sports participation: Identified social outcomes. *International Journal of Sport Management, Recreation, and Tourism, 11,* 25–41. https://doi.org/10.5199/ijsmart-1791-874X-11b

Sulkowski, M. L., Demaray, M. K., & Lazarus, P. J. (2012). Research-based practice: Connecting students to schools to support their emotional well-being and academic success. *Communique, 40(7).* Retrieved from http://www.nasponline.org/publications/periodicals/communique/issues/volume-40-issue-7

Taylor, M., & Turek, G. (2010). If only she would play? The impact of sports participation on self-esteem, school adjustment, and substance use among rural and urban African American girls. *Journal of Sport Behavior, 33,* 315–336.

Tracy, A., & Erkut, S. (2002). Gender and race patterns in the pathways from sports participation to self-esteem. *Sociological Perspectives, 45,* 445–466. https://doi.org/10.1525/sop.2002.45.4.445

Trudeau, F., & Shephard, R. J. (2008). Physical education, school physical activity, school sports, and academic performance. *International Journal of Behavioral Nutrition and Physical Activity, 5,* 1–12. https://doi.org/10.1186/1479-5868-5-10

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PEDAGOGY

Analysis of a Physical Education Teacher Education Field Experience of Working One-on-One With Students With Severe and Profound Disabilities in a Self-Contained Environment

Todd Estel Layne and Jennifer Blasingame

Abstract

Previous research suggests that physical education teacher education (PETE) programs offer few adapted courses and provide limited hands-on experiences with teaching students with disabilities, specifically those in a self-contained environment. This study aimed to analyze PETE students' and classroom teachers' perceptions of a field experience designed to provide PETE students the opportunity to work one-on-one with a student with severe and profound disabilities in a self-contained environment. Seventy-one pre–post electronic surveys (female = 20, male = 51) measuring the *perceptions of PETE students working one-on-one with a student with a severe disability in a self-contained environment were collected. PETE student and classroom teacher interviews were also conducted. Results revealed a significant difference in confidence for all PETE students pre– to post–field experience ($p < .001$) and a moderate level of enthusiasm at the beginning of the experience and great satisfaction at the conclusion. PETE students reported a lack*

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of experience prior to the field experience, but experienced growth through one-on-one instruction and gained a greater appreciation for life. Teachers appreciated the increased instructional time and their students' enjoyment. They also expressed a desire for the field experience to be lengthened. Based on the results of this study, it is evident that providing PETE students with field experiences to work with students with severe or profound disabilities can be a valuable part of a university PETE program. It is recommended that PETE programs seek opportunities in their area to assist programs that work to meet the needs of these students.

Service-learning opportunities among university physical education teacher education (PETE) programs have recently become more common (Bishop & Driver, 2007). However, many of these are devoted to the learning of teaching general physical education, with few "real-world" opportunities for PETE students to work with students with disabilities (Bishop & Driver, 2007). It is common for PETE programs to offer a course specifically designed for teaching students with disabilities (Hodge, Tannehill, & Kluge, 2003; Murphy, 2007; Rizzo & Kirkendall, 1995). However, these courses often offer opportunities for PETE students to expand their content knowledge, with little practical experience of working with students with disabilities (Hardin, 2005; Woodruff & Sinelnikov, 2015). Specifically, a limited amount of research examines student teachers' participation in service learning devoted to assisting students with disabilities in a self-contained environment (Rust & Sinelnikov, 2010; Sato & Haegele, 2017). For PETE students to be more adequately prepared for teaching students with disabilities, more field experiences are warranted (Hardin, 2005; Rust & Sinelikov, 2010; Sato & Haegele, 2017)

Block (1992) provided an understanding of the terms *severe* and *profound* to better classify the type of disabilities that student teachers should be prepared to assist. He described the term *severe* as "students who need exceptional assistance to benefit from educational and post-educational experiences" (Block, 1992, p. 199). Teachers should implement strategies to help prepare their students for participation in community settings once their education is complete. The term *profound* refers to students "who have very limited skills in terms of awareness, movement, and communication"

(Block, 1992, p. 199). Although learning for students with profound disabilities can occur, different instructional approaches should be considered due to the limited level of awareness and communication from these students. Limited field experiences in a PETE preparation program can potentially decrease PETE students' confidence of working with students with severe and profound disabilities. Even more, teachers who are hired to work with these students will face a daunting challenge.

In a review of PETE program demographics, Ayers and Housner (2008) discovered that 98% of responding programs provided field experiences, with 77% occurring in their first or second year. While this is a positive trend for the profession, only 19% offered a course or program in adapted physical education. These results suggest that many PETE students rarely, if ever, receive any experiences of working with students with disabilities.

Although experiences in adapted physical education have been limited, research findings have been positive. Studies have shown that adapted courses and field experiences have positively affected preparation and attitudes toward teaching students with disabilities (Block & Rizzo, 1995; Hardin, 2005; Hodge, 1998; Hodge et al., 2003; Rust & Sinelnikov, 2010; Sato & Haegele, 2017; Woodruff & Sinelnikov, 2015). Block and Rizzo (1995) discovered that teachers' attitudes toward teaching students with profound disabilities were more favorable when it was associated with additional adapted physical education coursework. Examining physical education teachers' view of their PETE programs, Hardin (2005) discovered that teachers credited their field experience teaching opportunities for enhancing their overall confidence for teaching students with disabilities. Rust and Sinelnikov (2010) found that even though PETE students felt prepared for teaching students with disabilities, they desired more hands-on experiences during their preparation program. With PETE students' increase in confidence and desire for more experience, additional service-learning opportunities can continue to provide positive change in the lives of PETE students and students with disabilities. Examining service-learning opportunities with students with disabilities, Woodruff and Sinelnikov (2015) discovered that PETE students progressed through three stages of learning during their service-learning experience: anticipation, familiarization, and

commitment. In the final stage, they shifted from "an internal focus on themselves to external concerns about well-being and improvements in the lives of the young adults with disabilities" (pp. 305–306).

Research has indicated that PETE programs need to include more practical experiences of working with students with severe and profound disabilities (Takahiro, Hodge, Casebolt, & Samalot-Rivera, 2015). Block (1992) believed that physical education for students with disabilities should "emphasize the same goals and objectives as regular physical education with modifications as needed to ensure safe, successful, and beneficial participation" (p. 210). For this to occur, PETE students need additional knowledge and experience of teaching physical education to students with severe and profound disabilities. One study examined graduate students teaching physical education to students with severe and profound disabilities during practicum experiences (Sato & Haegele, 2017). Although PETE students dealt with some unpredictable behaviors and ambiguous roles, through the support of cooperating teachers they experienced satisfaction in contributing to the education of students with severe and profound disabilities. The challenge for PETE undergraduate programs is finding additional time for field experiences or adding additional courses to an already crowded degree plan.

Therefore, this study analyzed PETE students' and classroom teachers' perceptions of a field experience designed to provide PETE students the opportunity to work one-on-one with students with severe and profound disabilities in a self-contained environment. Specifically, this study aimed to determine PETE students' level of excitement and confidence of working with students with disabilities prior to and after the field experience and the beneficial aspects of the experience. In addition, this study describes the field experience format, to better assist PETE programs in the future. Results from this study can affect future opportunities of working with students with disabilities and potentially enhance the learning experience within a PETE program. As a result, PETE students will be more prepared for creating a quality physical education experience for all students. In addition, this study can provide PETE programs with the necessary feedback to strengthen the effectiveness of their teaching methodology and enhance the learning experience for all students.

Method

Participants

An electronic survey was delivered to PETE students to measure their perceptions of working one-on-one with students with severe and profound disabilities in a self-contained environment. Seventy-one surveys (female = 20, male = 51) were collected. Each student was an undergraduate physical education major. In addition, five classroom teachers and four PETE students participated in a one-on-one interview at the conclusion of the field experience.

Informed consent was obtained from all participants prior to the beginning of data collection. The research protocol was approved by the university's Institutional Review Board for Human Subjects Research.

Procedure

PETE students participated in a 15-hr field experience devoted to working with a special school for students with multiple disabilities ranging in age from 3 to 22. The school is located in the southeastern United States and works to meet the unique needs of students with multiple disabilities. The majority of these students are medically fragile and have conditions that at any moment may appear as life threatening. The faculty and staff consisted of 15 classroom teachers, 40 educational support professionals, 12 nurses, three physical therapists, three occupational therapists, two speech and language pathologists, one vision teacher, one librarian, one guidance counselor, and one adapted aquatics and physical education teacher.

To attend the school, the students must first be enrolled in the school in which they are assigned. Then they are referred to the Office of Exceptional Children. Upon further investigation by special education supervisors and the school's administration, the students are enrolled if it is deemed the most appropriate placement and the least restrictive environment. All students participate in specific objective-driven classroom instruction based on their own individual goals and objectives from their individualized educational plan (IEP).

In addition to classroom instruction, the students have the opportunity to engage in activities that are both fun and educational. These include music, library, swimming, basketball, and cheerleading. Other activities include a safety fair, community-based instruction outings, fall festival, Special Olympics, Valentine's social, prom, and a field day.

The school staff, with cooperation and commitment from the home and community, provide a supportive foundation for lifelong learning in a safe, nurturing, and challenging environment, while guiding all students to reach their individual academic, physical, social, and emotional potential. The faculty and staff of the school are dedicated to meeting the unique needs of the students. They believe that education should develop the whole student to his or her fullest potential. Realizing that all students do not learn at the same pace nor by the same methods, the school provides a variety of learning experiences and instruction.

Specifically in the area of physical education and aquatics, accommodations and modifications are a must in every activity. Most typical physical education classes teach gross motor movements to encourage lifelong physical fitness. The same theory applies to the adapted physical education classes, but the level of assistance and participation depends on the abilities of each student. In each physical education session, the educational support professionals attend with their class. All therapists are aware of the physical education schedule and attempt to attend with the students on their caseloads. While students are encouraged to be as independent as possible, hand-over-hand and maximum assistance is required for each student to be able to participate safely in the activities. When planning physical education activities for students with multiple disabilities, one must consider the limitations as well as the abilities of the students. Faculty concentrate on specific tasks, independent movement, intrinsic motivation, and overall enjoyment, as opposed to specific gross motor movements such as skipping, hopping, or running. Because the majority of the students are in wheelchairs, the activities must reflect the ability of the students and the adults to perform the activity. Some of the activities include parachute movement, rhythm movement, following directions, tossing and catching, and body movement and awareness. Ultimately, the classes focus on

having students move and follow directions as independently as possible. Literacy is a main component of all instruction schoolwide.

Literacy is incorporated into each physical education class with the teacher and students discussing a word of the week, reading a story that includes movement or relates to the lesson, and spelling out words within the activities or stations. The school also has a temperature-controlled swimming pool and multiple pieces of adapted equipment so the students can move and participate not only in physical education class, but also within the school environment and in the community. Students have adapted tricycles, gait trainers, and standers that allow them to move more independently and gain a different view of the world around them. The indoor swimming pool provides a sensory-rich, virtually weightless environment where the students can move freely and safely. Adapted physical education and aquatics contributes to the students' overall education and ability to learn. The school aims to help each student develop a positive self-concept, realize the value of learning, achieve the maximum level of independence, and become a productive citizen.

During the first half of the semester, PETE students learned about teaching students with disabilities. They became familiar with terminology, disabilities, and laws created to protect the rights of students with disabilities. Next, PETE students visited the school to take a tour, meet the teachers and students, and learn more about the goals and vision of the school. They were then randomly paired up and assigned to assist a classroom teacher with activities in that class. Each day, PETE students reported to the classroom where they worked in group and one-on-one settings for 90 min. This occurred twice a week for 5 weeks.

Examples of activities that PETE students experienced include rhythm and dance, basketball, aquatics, tossing and catching, following directions, and independent movement advanced communication (i.e., use of communication devices, reading body language, and interpreting verbal communication). As mentioned, literacy is a large part of all instruction within the school curriculum. PETE students led and participated in physical activities and in recreational games such as Bingo, read-alouds, and interactive games on the smartboard. They were responsible for completing a reflection after each visit and for designing a physical activity task for an individual student or the entire class. PETE students were

given the option due to the wide variety of abilities in the school. They also assisted with some of the school-sponsored events, which allowed them to get to the know the students with disabilities on a more personal level. Finally, PETE students were required to complete a notebook that included a compilation of acquired materials from their experience at the school. The notebook provided PETE students with a tool to assist them when working with students with disabilities. Having access to the information learned during a field experience can provide much needed confidence for many situations that PETE students may encounter.

Instrumentation

This study employed qualitative and quantitative measures. The researchers collected data through a survey that contained Likert-scale and open-ended questions. They created the survey using questions targeted for obtaining data related to PETE students' and classroom teachers' experience at the school. To help achieve content validity, the researchers had individuals with experience working with students with disabilities evaluate the survey. The survey was distributed to PETE students prior to and at the completion (Table 1) of their field experience. In addition, the researchers interviewed four PETE students at the beginning and end of their field experience to gain more insight on effect the field experience had on the PETE students. The researchers interviewed each classroom teacher at the conclusion of the field experience to provide perspective on how the overall experience affected each teacher's classroom. Table 2 includes a list of questions that were asked to the PETE students and teachers.

Data Collection

The researchers collected data through a presurvey and postsurvey that assessed PETE students' perceptions of participating in a field experience devoted to assisting students with profound and severe disabilities. The researchers interviewed all classroom teachers and four PETE students to provide a more in-depth discussion of the field experience. Finally, the researchers were present at each day of the field experience. During that time, PETE students were observed working in the classroom. The researchers maintained field notes to provide further analysis of the experience.

Table 1
Pre– and Post–Field Experience Survey

Pre–field experience	Post–field experience
1. Please choose your gender Male Female	1. Please choose your gender Male Female
2. Please choose your appropriate class rank Freshman Sophomore Junior Senior	2. Please choose your appropriate class rank Freshman Sophomore Junior Senior
3. Please describe your experiences of working with students with disabilities prior to your field experience.	3. Name 3 things that you enjoyed most about your field experience.
4. Rate your excitement level prior to starting your field experience. (Scale 1–10)	4. Were your assigned teachers cooperative throughout your experience? (Scale 1–10)
5. Please provide an explanation for your previous answer.	5. How will the time spent with the students benefit you in the future?
6. Rate your confidence level for teaching students with disabilities prior to starting your field experience. (Scale 1–10)	6. Please describe how this experience will help you to include students with disabilities in regular Physical Education classes.
7. Please provide an explanation for your previous answer.	7. After completing the field experience, rate your confidence level for teaching students with disabilities. (Scale 1–10)
	8. Rate your overall experience. (Scale 1–10)
	9. If you could change anything about your field experience, what would it be?

Table 2
PETE Student and Teacher Interview Questions

Student-Pre
1. Tell me about your experiences with individuals with disabilities. What do you remember most?
2. Working with individuals with disabilities. Tell me what you think would be rewarding? Challenging?
3. What do you think this experience will do for you?
4. How will it impact you as a Physical Education teacher? As a person?
Student-Post
1. Tell me about your experience.
2. Did your excitement level increase during the experience? Explain.
3. What was the most rewarding? Challenging?
4. Did your confidence level increase? Explain.
5. What did this experience do for you?
6. How did it impact you as a future Physical Education teacher? As a person?
Teacher-Post
1. How did the PETE students assist you?
2. What overall impact did this have on you as a teacher?
3. In the future, what would be most beneficial to you with regards to student assistance?
4. How did your students respond?
5. What impact does it have on them as students? Can you share an example?
6. Overall, would you like to continue to see assistance from the PETE students? Why? Why not?

Data Analysis

The researchers employed descriptive statistics to provide information regarding PETE students' Likert-scale responses to the survey. A one-way ANOVA determined whether change occurred regarding PETE students' confidence. Finally, the researchers analyzed open-ended responses from the PETE student surveys, as well as from PETE student and teacher interviews, using con-

stant comparison (Corbin & Strauss, 2008) and analytic induction methods (Patton, 2002). The researchers transcribed verbatim the audio-recorded data and then coded data with the goal of categorizing common themes based on the selected responses. The researchers then reanalyzed the data to confirm the created themes.

Results

A significant difference was found in confidence for all PETE students from pre– to post–field experience, $F(1, 140) = 21.99$, $p < .001$, as well as for males, $F(1, 100) = 15.98$, $p < .001$, and females, $F(1, 38) = 6.08$, $p < .05$ (see Table 3). At the beginning of the experience, PETE students expressed a moderate level of enthusiasm for working with students with severe disabilities ($M = 7.9$, $SD = 2.09$). This occurred even though 65% had no previous experience working with students with severe disabilities. PETE students expressed that their teachers were cooperative throughout their experience ($M = 8.9$, $SD = 2.04$). At the conclusion of their field experience, PETE students reported great satisfaction with the overall experience ($M = 9.4$, $SD = .96$).

Analysis of the surveys and interviews of the PETE students produced the themes of (1) lack of experience, (2) one-on-one instruction, and (3) appreciation for life. The teacher results produced the themes of (1) increased instruction, (2) student enjoyment, and (3) desire for lengthened field experience.

Students

Lack of experience. PETE students' lack of experience affected their level of enthusiasm for working with students with severe disabilities prior to the beginning of the field experience. There was a level of excitement, but PETE students expressed concern due to the new experience. One student provided, "I was unexperienced and very nervous because I had never been in an atmosphere like this school." Another PETE student had a similar response, "I am excited to get an opportunity to help students out but I am nervous at the same time because I do not know what to expect." Even with the lack of experience, PETE students expressed appreciation for receiving the hands-on training: "I have always had a heart for students with disabilities and am very excited about gaining more exposure in the gym/classroom."

Table 3
Descriptive Statistics for Effectiveness of Intervention

		Pre	Post	Intervention effect	
Variable	**Group**	***M* (*SD*)**	***M* (*SD*)**	***F*(*df*1, *df*2)**	***p***
Confidence	All (***n* = 71**)	6.59 (2.42)	8.16 (1.42)	21.99 (1, 140)	.000
	Male (***n* = 51**)	6.54 (2.57)	8.20 (1.51)	15.98 (1, 100)	.000
	Female (***n* = 20**)	6.75 (2.00)	8.05 (1.18)	6.08 (1, 38)	.018

One-on-one. PETE students experienced growth through their one-on-one interaction with the students with disabilities. One PETE student expressed, "It will [prepare me] to help any type of student no matter the challenge or the disability that child may have or present." Another stated, "It helped me realize that you have to know the student and what he or she can or can't do. You have to know their limits and help her or him without completely singling them out." Finally, one PETE student discussed how the experience will help improve teaching ability: "This helped me understand how to modify certain things and know how to keep everyone involved no matter what the circumstance may be."

Appreciation. PETE students expressed how the experience gave them a greater appreciation for life. One PETE student shared, "After the first day I got to work with the children, instantly they persuade(d) me to do all I can to make my life count." Another PETE student felt more prepared for future opportunities because of the knowledge gained through the experience: "Just because they have a disability doesn't mean they can't be physically active. I learned to find different ways to include students with disabilities into physical education classes." Finally, another PETE student described the overall benefit of the experience:

> It has changed the way I think and view others. It isn't the disability, it's the ability of what the students can do. They are human just like everyone else but just needs extra help. Treat them as you would treat anyone else.

Teachers

Increased instruction. The teacher–student ratio was low at the school, but there was still a need for more instructional time. One teacher expressed appreciation for the PETE students:

> I was in the middle of feeding and all the other kids were working on activities on the smartboard or working on physical activity positioning. I hate that because I'm over here feeding them and I'm kind of leaving the other kids to themselves and they came in and worked with the kids so they weren't just sitting or looking at the TV.

One teacher shared how one student with a disability had difficulty being around other kids: "Ricky can't always be next to the other kids. Just for him to have that one-on-one (instruction), he loved it, it was beneficial for him to have that one-on-one for that amount of time and have that much fun."

Student enjoyment. Teachers stated that their students loved seeing the PETE students come into the classroom: "My students can tell when someone doesn't want to be around them but they didn't feel that at all. They looked forward to them coming at their scheduled time." Another teacher shared how a normally reserved child opened up when the PETE students arrived: "Michael saw them and got excited and goes straight to them and [he] is not good with strangers. So, that was actually really good for him to be comfortable with someone new."

Lengthened field experience. All the teachers expressed a desire for the field experience to continue at the school. Their desire was that the field experience would be longer in duration. One teacher summarized it best: "Yes! I want [them] to come and I'm looking forward to them coming back next school year and coming for the prom. The children love it because they want to interact and move."

Discussion

Findings from this study provide evidence that opportunities to work with students with severe and profound disabilities can enhance the learning experience for physical education students and provide much needed support to classroom teachers. The uniqueness of working with students one-on-one can enrich awareness and thus provide greater potential for teaching students with disabilities in the future.

Results from this study supported research suggesting that practical experience can positively affect PETE students' confidence and overall satisfaction of working with students with disabilities

(Hardin, 2005; Hodge, 1998; Hodge et al., 2003; Sato & Haegele, 2017; Woodruff & Sinelnikov, 2015). Survey results revealed that although PETE students started out with a moderate level of confidence, there was a significant change after the completion of the field experience. This matches the findings from Hardin (2005), who found that teacher confidence increased after the initial teaching experience with students with disabilities. Similarly, Hodge et al. (2003) found that PETE students believed they could take what was learned through the field experience and apply it to a physical education program. This representation of confidence is needed to provide high-quality instruction to students with disabilities.

Another factor that helped increase confidence and overall satisfaction was the opportunity for PETE students to witness student success. In the beginning, PETE students did not believe that students with severe or profound disabilities would have many capabilities. Many, if not all, were able witness the students having success with communicating, motor development, and expressing enjoyment. After witnessing these abilities, PETE students experienced reduced anxiety and commanded an ownership of their role. Rust and Sinelnikov (2010) discovered that a teacher believed that the success of a lesson was dependent upon the enjoyment and participation of the student. Regarding this study, seeing students experience success helped reduce anxiety and increase PETE students' confidence for working with students with disabilities. Finally, being able to interact with the teachers allowed PETE students to see what it takes to be successful in working with students with disabilities. Takahiro et al. (2015) stated that teacher candidates believed that their confidence increased from having opportunities to interact and learn from special education teachers. Sato and Haegele (2017) found that graduate students could overcome unexpected difficulties through the example established by the cooperating teacher. PETE programs should consider strategies for future engagement between PETE students and special education teachers to enhance the overall experience.

Findings from this study produced some themes related to the PETE student experience. Many PETE students expressed a lack of confidence based solely on having limited or no experience of working with students with severe or profound disabilities. PETE students were somewhat excited about the opportunity, but were not sure what

to expect. These findings support Woodruff and Sinelnikov (2015), who discovered that undergraduate students expressed anticipation about the unknowns involved in working with students with disabilities. From observation, it was noted that PETE students were more at ease once they could have one-on-one interactions with students and have an opportunity to assist them with classroom work or play. This too supports Woodruff and Sinelnikov (2015), who found that undergraduate students entered a stage of familiarization at the end of their second or third week. During this stage, interpersonal relationships develop and student teachers begin to feel more comfortable in their role.

Many PETE programs seek to provide practical experience with the goal of preparing PETE students for teaching physical education. Often, PETE students will have previous experience of working with children, whether in coaching sports, working in summer camps, or interacting with family. These experiences can help PETE students as they transition into the classroom and learn how to become a teacher. This is not the case with working with students with disabilities. Due to their lack of experience, PETE students had low confidence at the start of this study. One factor that had the biggest effect on PETE students' confidence was the opportunity for PETE students to work with students with disabilities one-on-one. This contradicts the findings of Rust and Sinelnikov (2010). In their study, their participant believed that it would have been more beneficial to work with more students, since most practical opportunities would not be one-on-one. Regardless, this study found that working one-on-one for the duration of the experience allowed PETE students to develop a relationship with their student and focus on the student's developmental needs.

In addition, the teachers were appreciative of the attention that their students were receiving. Physical education teachers may be challenged with teaching large classes. Although teachers aim to maximize feedback and increase the amount of learning opportunities, this can be challenging with large classes. With this experience, PETE students could work one-on-one and receive the benefits that come with it. Finally, PETE students expressed a greater appreciation for life. Woodruff and Sinelnikov (2015) mention that the goal of service learning is the "development of a lifelong sense of caring

for others" (p. 306). PETE programs should emphasize the development of "caring" teachers. Regardless of ability, teachers should always place importance on the lives of their students.

Teacher interviews also produced some interesting results. Teachers often find themselves spending a lot of time with each of their students, each who has unique needs. Because of this, other students may be neglected, even in a class with fewer than 10 students. Often, these students are sitting idly with no interaction with others. All teachers enjoyed that their students received more attention due to the PETE students being there. Because of these interactions, they witnessed an increase in enthusiasm from their students. Teachers who work with students with severe or profound disabilities look for any possibility to celebrate success. Teachers shared how they could see improvements in their students who were able to spend time with the PETE students. For those reasons, all the teachers expressed a desire for the field experience to continue the following year. Some even asked if it could be a year-round experience. The positive responses suggest that PETE programs should examine their program to determine if this would be possible.

Conclusion and Practical Application

Research has shown that PETE programs offering field experiences for working with students with disabilities are becoming more common (Bishop & Driver, 2007). Based on the results of this study, it is evident that providing PETE students with field experiences to work with students with severe or profound disabilities can be a valuable part of a university PETE program. A commitment of as little as 15 hr can greatly affect the lives of PETE students and thus greatly enhance their potential for developing high-quality physical education programs, specifically programs that teach students with ALL types of disabilities. We recommend that PETE programs seek opportunities in their area to assist programs that work to meet the needs of students with severe or profound disabilities. These experiences can promote confidence and enthusiasm in PETE students and thus enhance the physical education instruction for students with disabilities.

References

Ayers, S., & Housner, L. (2008). A descriptive analysis of undergraduate physical education teacher education programs. *Journal of Teaching in Physical Education, 27*, 51–67. https://doi.org/10.1123/jtpe.27.1.51

Bishop, J., & Driver, S. (2007). Implementing service-learning in undergraduate adapted physical education. *Journal of Physical Education, Recreation, and Dance*, *78*(8), 15–19. https://doi.org/10.1080/07303084.2007.10598071

Block, M. E. (1992). What is appropriate physical education for students with profound disabilities? *Adapted Physical Activity Quarterly*, *9*(3), 197–213. https://doi.org/10.1123/apaq.9.3.197

Block, M. E., & Rizzo, T. L. (1995). Attitudes and attributes of physical educators associated with teaching individuals with severe and profound disabilities. *Journal of the Association for Persons With Severe Disabilities, 20*, 80–87. https://doi.org/10.1177/154079699502000108

Corbin, J., & Strauss, A. (1998*). Basics of qualitative research: Techniques and procedures for developing grounded theory* (3rd ed.) Thousand Oaks, CA: Sage.

Hardin, B. (2005). Physical education teachers' reflections on preparation for inclusion. *Physical Educator*, *62*, 44–56.

Hodge, S. (1998). Prospective physical education teachers' attitudes toward teaching students with disabilities. *Physical Educator, 55,* 68–77.

Hodge, S., Tannehill, D., & Kluge, M. (2003). Exploring the meaning of practicum experiences for PETE students. *Adapted Physical Activity Quarterly, 20,* 381–389. https://doi.org/10.1123/apaq.20.4.381

Murphy, K. (2007). Addressing changing times: Teaching disability etiquette to PETE students. *Journal of Physical Education, Recreation, and Dance*, *78*(7), 41–44. https://doi.org/10.1080/07303084.2007.10598056

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

Rizzo, T., & Kirkendall, D. (1995). Teaching students with mild disabilities: What affects attitudes on future physical educators? *Adapted Physical Activity Quarterly, 12*, 205–216. https://doi.org/10.1123/apaq.12.3.205

Rust, R., & Sinelnikov, O. (2010). Practicum in a self-contained environment: Pre-service teacher perceptions of teaching students with disabilities. *Physical Educator*, *67*, 33–45.

Sato, T., & Haegele, J. A. (2017). Graduate students' practicum experiences instructing students with severe and profound disabilities in physical education. *European Physical Education Review*, *23*, 196–211. https://doi.org/10.1177/1356336X16642717

Takahiro, S., Hodge, S. R., Casebolt, K., & Samalot-Rivera, A. (2015). Physical education teacher candidates' beliefs about instructing students with disabilities in adapted aquatics. *International Journal of Aquatic Research and Education*, *9*, 308–328.

Woodruff, E. A., & Sinelnikov, O. A. (2015). Teaching young adults with disabilities through service learning. *European Physical Education Review*, *21*, 292–308. https://doi.org/10.1177/1356336X14564171

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PEDAGOGY

Analyzing the Contribution of Student-Perceived Motivational Climate to Predict Student Goal Adoption in Physical Education: Testing Invariance Relative to Teacher-Induced Climate

Stéphanie Girard and Jean Lemoyne

Abstract

Based on achievement goal theory, this study aimed to verify if relationships between student-perceived motivational climate and student achievement goals differ by teacher-induced climates in physical education (PE). A sample of 651 French Canadian students and 23 PE teachers (categorized in three clusters) completed self-report questionnaires. To verify if the climate–goals relationships differ according to the teacher-induced climate, this study conducted a multigroup invariance analysis. The results revealed full invariance across groups for means and intercepts. However, only partial invariance was observed for variance, covariances, structural weights, and residuals, indicating that, despite disparities between students'

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and teachers' perceptions, the teacher-induced climate seems to play a role in students' goal adoption in PE. This study refines current understanding of the climate–goals relationship by considering the teachers' perspective of their practices in PE. Practical implications are discussed.

In the domain of health education, antecedent research demonstrates the multiple benefits of an active lifestyle during youth (Janssen & LeBlanc, 2010). Despite such evidence, adolescence in Canada is a stage of development where sedentary behavior increases, which results in a high proportion of insufficiently active people (Tremblay et al., 2010). Physical education (PE) represents an opportunity for teachers to enhance adolescents' awareness of the benefits of being active, as well as of their physical activity behavior. In this regard, it is plausible that high levels of motivation and engagement in PE are factors associated with an active lifestyle outside of school (Cox, Smith, & Williams, 2008).

Achievement goal theory (AGT; Ames & Archer, 1988) posits interplay between the classroom environment established by teachers and its influence on students' motivation, attitudes, and behaviors. Sarrazin, Tessier, and Trouilloud (2006) define motivational climate as "the learning environment that can influence students' goals and motivation" (p. 149). Moreover, goals adopted in PE can influence students' attitudes toward physical activity, as well as their level of physical activity behaviors (Papaioannou, Zourbanos, Krommidas, & Ampatzoglou, 2012). Therefore, this study examined how motivational climate determines students' achievement goals, while simultaneously considering teachers' and students' perceptions. Recently, Trouilloud (2015) concluded that considering both measures of motivational climate was important for refining the understanding of the relationships between motivational climate and motivational processes in PE. To researchers' knowledge, few data are available regarding relationships between teachers' and students' perceptions of motivational climate, and it seems that they do not always correspond (Trouilloud, 2015). In practical terms, it is conceivable that teachers' pedagogical practices, when not adequately perceived by their students, may be less optimal for their motivation.

Achievement Goal Theory

The trichotomous model of AGT holds that people can pursue three types of goals when engaging in an activity[1]: (1) mastery, (2) performance-approach, and (3) performance-avoidance (Elliot & Church, 1997). People assess their competence according to individual criteria when aiming for mastery goals. When pursuing mastery goal orientation, individuals aim to progress as much as possible to improve their abilities. Confronted by realistic challenges, they will make efforts and persevere. In contrast, when adopting performance goals, people assess their competence in comparison to others or to normative standards. If they think they can outperform others, they tend to adopt performance-approach goals. On the other hand, if they feel less capable than others, they may want to protect themselves from failure by pursuing performance-avoidance goals.

Mastery and performance-approach goals are associated with high feelings of competence[2] and are qualified as *approach* goals because individuals seeking them are oriented toward success (Elliot, 1999). Consequently, approach goals come with positive consequences such as effort and enjoyment. However, performance-approach goals can also generate unfavorable consequences such as anxiety and negative attitudes toward an activity (Papaioannou et al., 2012). On the other hand, individuals adopting performance-avoidance goals are oriented toward the fear of being surpassed by other students. Thus, they often feel less competent and are more inclined to be afraid to fail in an activity, resulting in the adoption of performance-avoidance strategies (Elliot, 1999). Accordingly, in comparison to the pursuit of approach goals, pursuing performance-avoidance goals can be detrimental to students' motivation and engagement in PE (Papaioannou et al., 2012).

[1]AGT researchers have suggested other taxonomies of achievement goals (from 2 to 6: see Elliot, 1999). However, some of these goals (e.g., mastery-avoidance) are still being questioned by some and are less likely to be understood by young high school students (Garn, Ware, & Solmon, 2011). For these reasons, they were not included in this study.

[2]The overall judgment that an individual has of him- or herself relative to a given field of activity (Harter & Connell, 1984).

Motivational Climate in PE

Consistent with achievement goals, motivational climate can be defined in terms of mastery, performance-approach, and performance-avoidance (Papaioannou, Milosis, Kosmidou, & Tsigilis, 2007). When teachers emphasize effort and individual progression, a mastery motivational climate usually occurs. When teachers put forward a performance-approach climate, more attention is paid to competition between students and the importance of outperforming others. In a performance-avoidance climate, teachers also encourage competition between students and compare them for ability level. The difference with a performance-approach climate is that teachers convey the message to students that it is important that they avoid being less capable than their classmates (Papaioannou et al., 2007). Those types of climates are not mutually exclusive, meaning that a teacher may foster a mastery climate while adopting teaching approaches that could nurture performance-approach or -avoidance climates. For example, a teacher could encourage a student to put a lot of effort in a running task by saying things like "Just a little faster, I know you can do it!" (mastery climate) while comparing the student to others who are better than him or her: "This time, I don't want you to finish last!" (performance-avoidance climate).

Even though PE teachers intend to establish a motivational climate, students might interpret their teaching practices otherwise. In fact, depending on each student's expectations and previous experiences (Maehr, 1984), the motivational climate might differentially affect the student's cognition, behaviors, and performance (Fontayne & Bohuon, 2011). For these reasons, Ames (1992) recommended the measurement of students' perceptions of motivational climate. Consequently, most antecedent AGT research considered students' perception of motivational climate uniquely (Harwood, Keegan, Smith, & Raine, 2015). In antecedent research using AGT framework, two studies explored congruency between the two climate measures: one in sport and one in PE (Boyce, Gano-Overway, & Campbell, 2009; Morgan, Sproule, Weigand, & Carpenter, 2005). Moreover, these studies did not contemplate both subdimensions of the performance climate (approach and avoidance).

According to AGT, students tend to adopt goals that are in accordance with the motivational climate they perceive, which

suggests that climate determines students' goal adoption. For example, as the literature shows, the mastery climate influences students to adopt mastery goals in PE (Barkoukis, Ntoumanis, & Thøgersen-Ntoumani, 2010; Girard, Chouinard, & St-Amand, 2015; Halvari, Skjesol, & Bagøien, 2011; Wang, Liu, Chatzisarantis, & Lim, 2010). Climate–goals relationships involving other dimensions are less consistent, as is the predictive value of the performance motivational climate on performance goals (approach and avoidance). For example, the mastery motivational climate sometimes displays a positive relationship with performance-approach goals (Ommundsen, 2006) and a negative relationship with performance-avoidance goals (Erturan-İlker & Demirhan, 2012). Nevertheless, it seems that these relationships are not always significant (Papaioannou et al., 2007). Moreover, the negative relationship between the perception of a performance-avoidance climate and the adoption of mastery goals (Erturan-İlker & Demirhan, 2012) is not always significant (Girard et al., 2015). As another example, some researchers have observed that performance-avoidance goals may be predicted by the perception of a performance-approach climate (Papaioannou et al., 2007), whereas others have demonstrated that performance-avoidance goals are determined by a performance-avoidance climate (Erturan-İlker & Demirhan, 2012). Based on such mixed results, it is plausible that these relationships might be affected by a teacher-induced climate.

Few studies have made the *approach–avoidance* distinction with performance motivational climate in PE (Erturan-İlker, 2014; Erturan-İlker & Demirhan, 2012; Girard et al., 2015; Papaioannou et al., 2007). By splitting the performance climate into approach and avoidance dimensions, this study contributes to a better understanding of climate–goals relationships, which are of particular importance for high school PE teachers who want to enhance students' motivation. Indeed, it seems that high school PE teachers in the province of Quebec are more inclined to establish a performance motivational climate than are their colleagues from elementary schools (Baril, Paquette, & Ouimet, 2014). This reality also occurs in other countries (Barkoukis et al., 2010; Spray, Warburton, & Stebbings, 2013).

In line with Trouilloud's (2015) argument that studies would benefit to consider both students' and teachers' perceptions of the motivational climate, this study aims (1) to verify

if the student-perceived motivational climate varies according to teacher-induced motivational climates and (2) to verify the invariance of the climate–goals relationships according to these teacher-induced motivational climates.

Method

Participants and Procedures

The sample consists of 651 students (72% middle school, n_{girls} = 284, n_{boys} = 176, $n_{unknown}$ = 8; 28% high school, n_{girls} = 125, n_{boys} = 55, $n_{unknown}$ = 3) and 23 PE teachers (70% middle school, 4 females; 30% high school) from 11 public high schools located in an urban region (Montreal, Canada). Participants from regular PE classes were included in the study. A regular PE school program comprises 50 hr allocated to mandatory physical education per school year, repartitioned on 180 days from the end of August to the end of June. After ethics approval was received for this study, permission was granted by school boards and principals. PE teachers, students, and parents assented by signing a consent form. Because we wanted to make sure that the motivational climate was well established in all PE classes, we collected data at the end of the school year (in May). One research member collected all data with questionnaires during the first 15 min of PE classes. Teachers and students completed the questionnaires at the same time (teachers were separated from students). We informed all participants about the confidentiality of their answers, to limit possible response bias. Moreover, we advised teachers to answer according to their current pedagogical practices.

Measures

We measured three constructs: teacher-induced motivational climate, student-perceived motivational climate, and students' achievement goals in PE. Because the scales were in English, we had an English-French translator perform translation of the questionnaires. Then, with the French items, we analyzed psychometric properties of each scale and calculated composite score (mean score for items representing a factor) for each variable.

We measured the teacher-induced motivational climate with a modified, teacher-adapted version of the Perceptions of a Physical Education Teacher's Emphasis on Achievement Goals Questionnaire

(Papaioannou et al., 2007). This questionnaire assesses three motivational climates: mastery, performance-approach, and performance-avoidance. Antecedent research supported acceptable construct validity of this instrument in high school PE (Papaioannou et al., 2007). Participants indicated their level of agreement with each sentence on a 5-point Likert scale from 1 (*totally disagree*) to 5 (*totally agree*). For the mastery climate (4 items), participants (e.g., teachers) responded to items such as "In my physical education classes, I am very satisfied when someone shows improvement after a hard effort." For the performance-approach climate (5 items), teachers indicated their level of agreement with items such as "In my PE classes, I am absolutely satisfied with students who performed better than others." Finally, we measured the performance-avoidance climate (4 items) with items such as "In my PE classes, I made students avoid skills and games in which their abilities could be criticized." We assessed reliability by calculating Cronbach's alpha, which resulted in acceptable values in two of the three scales ($\alpha_{mastery} = .80$; $\alpha_{perf\text{-}app} = .70$). The performance-avoidance climate scale was non-optimal ($\alpha_{perf\text{-}avoid} = .61$), and interpretation of this variable will be cautious. We analyzed the composite score for each factor, which resulted in three factor scores: mastery, performance-approach, and performance-avoidance.

We assessed the student-perceived motivational climate in PE with the Perceptions of Physical Education Teacher's Emphasis on Achievement Goals Questionnaire (Papaioannou et al., 2007). Students' perceptions of the PE motivational climate were measured in the same way as the procedure described in the teacher-induced motivational climate. For students' perceived mastery climate (5 items, 1 [*totally disagree*] to 5 [*totally agree*]), participants (i.e., students) responded to questions such as "This year, in my PE classes, my teacher is very satisfied when someone is showing improvement after hard effort." We measured the performance-approach climate with four items such as "This year, in my PE classes, my teacher was absolutely satisfied with students who performed better than others." We measured the performance-avoidance climate with four items such as "This year, in my PE classes, my teacher made me avoid skills and games in which my abilities could be criticized." Psychometric properties were similar for students' scales: $\alpha_{mastery} = .81$, $\alpha_{perf\text{-}app} = .72$,

and $\alpha_{perf\text{-}avoid}$ = .66. We also calculated composite scores for further analyses.

We assessed students' achievement goals in PE with the Achievement Goal Scale (AGS; Papaioannou et al., 2007). Each AGS item was measured on a 5-point Likert-type scale ranging from 1 (*totally disagree*) to 5 (*totally agree*). We gauged mastery goals with five items such as "In my PE classes, my goal is to improve my skills." For performance-approach goals, students responded to five items such as "In my PE classes, my goal is to overcome others in drills and games." Finally, we measured performance-avoidance goals with four items such as "In my PE classes, my goal was to avoid drills and games in which I may be gibed for my abilities." Psychometric properties were similar with what was observed with the perceived climate questionnaires: $\alpha_{mastery}$ = .83, $\alpha_{perf\text{-}app}$ = .82, and $\alpha_{perf\text{-}avoid}$ = .62. We calculated composite scores for further study analyses.

Statistical Analyses

We performed all statistical analyses using SPSS and AMOS 23 software. Due to the low proportion of missing data (none for teachers' items; 0.3%–2.9% for students' items), we did not apply imputation procedures prior to performing item parceling (calculating mean score between corresponding items) on each factor. We also tested data for multicollinearity. In this case, tolerance was above .2 and *variance inflation factor* (VIF) was below 1, indicating no multicollinearity (Kline, 2011).

As a first step of our analyses, we identified the different combinations of teacher-induced motivational climates among our sample. To do so, we conducted cluster analyses by using the "K-means" method. This procedure resulted in three teacher-induced motivational climate clusters: (1) "mastery/performance-avoidance" (Group 1: n = 4), (2) "mastery/performance-approach" (Group 2: n = 10), and (3) "mastery" (Group 3: n = 9). Subsequently, a one-way ANOVA showed that the teacher-induced mastery climate was not significantly different among the three groups, $F(20, 2) = 0.73$, $p > 0.5$. However, we observed significant group differences on the teacher-induced performance-approach, $F_{perf\text{-}app}(20, 2) = 14.27$, $p < 0.01$, and the performance-avoidance climate measures, $F_{perf\text{-}avoid}(20, 2) = 28.80$, $p < .01$. Then, to verify if the teacher-induced climate differed from the student-perceived motivational climate

in each cluster, we conducted independent *t* tests. For the second aim of the study, we performed multigroup path analysis invariance using maximum likelihood (ML) estimation (see the tested model, Figure 1).

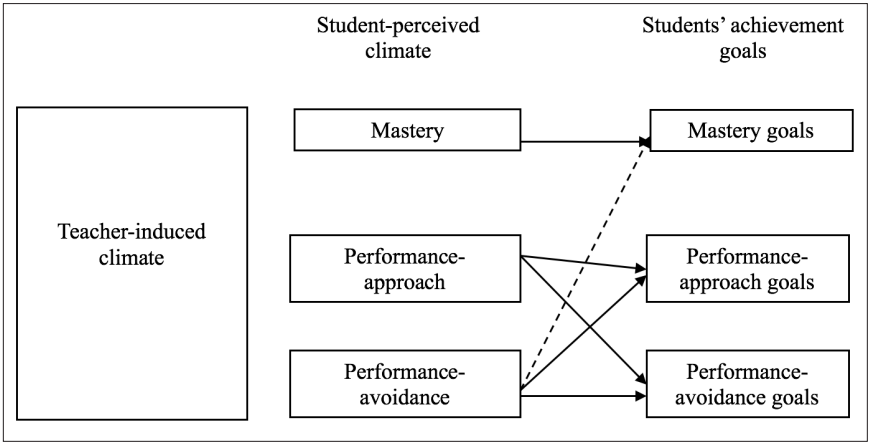

Figure 1. The hypothesized model: Relationships between teacher-induced climate, student-perceived climate, and students' achievement goal adoption. Dashed lines represent hypothetical, negative relationships between these two constructs.

We tested full parameter invariance across the groups by following these steps: (1) factor means, (2) covariances, (3) structural weights, and (4) structural residuals. Factor means represent the mean score for each factor. Covariances correspond to the relationships between each factor. Structural weights are the factor loadings explaining relationships between predictors and outcomes, and structural residuals are the error terms associated with each factor. At each step, if the chi-square difference test ($\Delta\chi^2$) was significant, we released the constraints one by one to identify which one was not invariant across groups (Byrne, 2010). After releasing those specific constraints, we compared the "partially" invariant model to the previous reference model. If the increase in chi-square was nonsignificant, we then analyzed the next step.

We used different fit indices to interpret model parameters. The chi-square statistic (χ^2) should be nonsignificant, the comparative fit index (CFI) should be above .95, and finally, the root mean square error of approximation (RMSEA) should be below

.06 while providing a narrow confidence interval (low 90–high 90) with probability higher than .50 (Hu & Bentler, 1999; Jöreskog & Sörbom, 1996). We also examined the standardized residual covariance matrix to determine if the model explained the data adequately. Values below 2.58 were acceptable for each standardized residual covariance (Byrne, 2010).

Results

Table 1 presents descriptive statistics relative to each cluster and comparisons between teacher-induced and student-perceived motivational climates. For teacher and student measures, all group comparisons showed significant differences (t varying between 2.06 and 7.89, with $p < .05$), except for performance-approach measures in the mastery/performance-approach climate ($t = .27$, $p > .5$) and performance-avoidance measures in the mastery climate ($t = .20$, $p > .5$). These results suggest the presence of a gap between teachers' and students' perceptions.

Table 1
Descriptive Statistics (Means and Standard Deviations) and Teacher-Induced and Student-Perceived Motivational Climates Comparisons

Measure	Group 1	Group 2	Group 3
Teachers	$N = 4$	$N = 10$	$N = 9$
Mastery	4.88 ± 0.25	4.63 ± 0.58	4.83 ± 0.28
PerfApp	2.00 ± 0.32	2.78 ± 0.43	1.71 ± 0.50
PerfAv	4.25 ± 0.61	2.38 ± 0.40	2.06 ± 0.54
Students	$N = 111$	$N = 290$	$N = 250$
Mastery	4.04 ± 0.81	3.94 ± 0.94	3.98 ± 0.85
PerfApp	2.82 ± 1.00	2.82 ± 1.00	2.70 ± 0.98
PerfAv	1.94 ± 0.25	1.93 ± 0.86	2.00 ± 0.88
Teacher–student comparisons (t tests)	$t_{M} = 2.06^{\star}$ $t_{PAp} = 5.50^{\star}$ $t_{PAv} = 5.50^{\star}$	$t_{M} = 3.60^{\star}$ $t_{PAp} = 0.27$ $t_{PAv} = 3.30^{\star}$	$t_{M} = 7.89^{\star}$ $t_{PAp} = 5.57^{\star}$ $t_{PAv} = 0.20$

Note. PerfApp = performance-approach; PerfAv = performance-avoidance; Group 1 = mastery/performance-avoidance; Group 2 = mastery/performance-approach; Group 3 = mastery.

$^{\star}p < .05$.

Table 2 displays the fit indices for the tested models. The initial model (Model A) resulted in an acceptable fit, $\chi^2 = 24.477$, $p = .018$, RMSEA = .040 (.016–.063, $p = .740$), CFI = .978, SRMR = .059. The second model assessing means and intercepts invariance (Model B) also yielded an acceptable fit, and the chi-square difference was not significant, $\Delta\chi^2(12) = 10.678$, $p > .05$.

The full variances and covariances invariance model (Model C) failed, as the chi-square increased significantly, $\Delta\chi^2(12) = 21.222$, $p < .05$. Releasing the constraint for the covariance between the student-perceived mastery and performance-approach climates in the mastery teacher-induced climate (Model D) yielded a nonsignificant difference compared with the full means and intercepts invariance model (Model B).

The full structural weights invariance model (Model E) failed, as the chi-square increased significantly, $\Delta\chi^2(12) = 27.662$, $p < .05$. Releasing the constraints for (1) the path between the student-perceived performance-approach climate and students' performance-avoidance goals in the mastery/performance-approach teacher-induced climate and (2) the paths between the student-perceived performance-avoidance climate and students' performance (approach and avoidance) goals in the mastery/performance-avoidance teacher-induced climate (Model F) yielded a nonsignificant difference compared with the partial variances and covariances invariance model (Model D).

The full structural residual invariance model (Model G) failed, as the chi-square increased significantly, $\Delta\chi^2(10) = 21.635$, $p < .05$. Releasing the constraint for the students' mastery goal error variance in the mastery/performance-approach teacher-induced climate (Model H) yielded a nonsignificant difference compared with the partial structural weights invariance model (Model F).

Table 3 displays the values of all parameters for the three groups. Where an invariant parameter was observed across all groups, only one value is presented. Where a parameter was invariant across two groups, two values appear. Means, variances, and intercepts were invariant across teacher-induced climate groups, indicating a gap between students' and teachers' perception of the climate. The students' mastery goals error variance was higher in the mastery/performance-approach climate compared to the other two groups.

Table 2
Tests for Multigroup Invariance Across Three Teacher-Induced Motivational Climates in PE

Model		Compared model	χ^2 (*df*)	$\Delta\chi^2$ (*df*)	RMSEA	CFI
A	Baseline model (unconstrained)		24.477 (12)*	-	.040 (.016–.063)	.978
B	Full means and intercepts invariance	A	35.154 (24)	10.678 (12)	.027 (.000–.045)	.980
C	Full variances and covariances invariance	B	56.376 (36)*	21.222 (12)*	.030 (.013–.044)	.964
D	Partial variances and covariances invariance	B	44.703 (35)	9.549 (11)	.021 (.000–.037)	.983
E	Full structural weights invariance	D	72.365 (47)*	27.662 (12)*	.029 (.014–.041)	.956
F	Partial structural weights invariance	D	57.480 (44)	12.662 (9)	.022 (.000–.036)	.976
G	Full structural residual invariance	F	79.115 (54)*	21.635 (10)*	.027 (.012–.039)	.956
H	Partial structural residual invariance	F	69.332 (53)	11.852 (9)	.022 (.000–.035)	.971

Note. Group 1 = mastery/performance-avoidance; Group 2 = mastery/performance-approach; Group 3 = mastery; Full invariance = with all constraints; Partial invariance = without some constraints.

*$p < .05$.

Accordingly, in that combination of climate, the model explained less mastery goals variance (R^2 = 20.7%) than in the other groups (R^2 = 27%). Moreover, in the mastery/performance-avoidance climate, the performance-approach goals explained variance (R^2 = 19.1%) was lower than in the other two groups (R^2 = 22.5%), but to a lesser extent. The performance-avoidance goals explained variance varies in each combination of teacher-induced, but remains low (R^2_{group1} = 3.6%; R^2_{group2} = 6.9%; R^2_{group3} = 9%).

Table 4 displays regression weights and covariances for the three groups. Again, where an invariant parameter was observed across all groups, only one value is presented. Where a parameter was invariant across two groups, two values appear. Regression weights between the student-perceived mastery climate and students' mastery goals, as well as between the student-perceived performance-approach climate and students' performance-approach goals, were equal across groups. In line with the low proportion of the performance-avoidance goals explained variance, in the mastery/performance-avoidance climate the student-perceived performance-avoidance climate shows no significant association with students' adoption of performance-avoidance goals. In the other two groups, that relationship was significant. In all groups, the student-perceived performance-avoidance climate determined students' adoption of performance-approach goals, but the relationships were weaker in the mastery/performance-avoidance climate. In contrast with the mastery/performance-avoidance and mastery teacher-induced climate, there was no significant association between the student-perceived performance-approach climate and students' adoption of performance-avoidance goals in the mastery/performance-approach teacher-induced climate. All covariances were equal across groups except for one between the student-perceived mastery and performance-approach climates. In the mastery teacher-induced climate, that association was negative, while it was positive in the other two combinations of motivational climates.

Table 3

Invariant and Non-Invariant Means (Standard Errors), Intercepts, Variances, and Squared Multiple Correlations in Three Teacher-Induced Motivational Climates in PE

	M (*SE*)			Variances (*SE*)			R^2		
Variable	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1 %	Group 2 %	Group 3 %
Mastery climate	3.967 (.034)			.777 (.043)					
PerfApp climate	2.774 (.039)			.985 (.055)					
PerfAv climate	1.959 (.034)			.744 (.041)					
	Intercepts (*SE*)			**Error variances (*SE*)**					
Mastery goals (e2)	1.809 (.174)			.567 (.042)	.800 (.066)	.567 (.042)	27.0	20.7	27.0
PerfApp goals (e3)	.879 (.119)				.886 (.049)		19.1	22.5	22.5
PerfAv goals (e4)	1.988 (.113)				.781 (.043)		3.6	6.9	9.0

Note. PerfApp = performance-approach; PerfAv = performance-avoidance; Group 1 = mastery/performance-avoidance; Group 2 = mastery/performance-approach; Group 3 = mastery.

Table 4
Invariant and Non-Invariant Regression Weights and Covariances in Three Teacher-Induced Motivational Climates in PE

	Regression weights (*SE*)		
Variable	**Group 1**	**Group 2**	**Group 3**
Mastery goals ← Mastery climate	.524 (.036)***		
PerfApp goals ← PerfApp climate	.411 (.040)***		
PerfAv goals ← PerfAv climate	.097 (.058)	.244 (.044)***	
PerfApp goals ← PerfAv climate	.121 (.060)*	.215 (.047)***	
PerfAv goals ← PerfApp climate	.121 (.039)**	.064 (.040)	.121 (.039)**
	Covariances (*SE*)		
PerfApp climate ↔ PerfAv climate	.322 (.036)***		
Mastery climate ↔ PerfAv climate	-.129 (.030)***		
Mastery climate ↔ PerfApp climate	.119 (.042)**		-.109 (.052)*
e3 ↔ e4	.146 (.033)***		
e2 ↔ e3	.117 (.030)***		

Note. PerfApp = performance-approach; PerfAv = performance-avoidance; Group 1 = mastery/performance-avoidance; Group 2 = mastery/performance-approach; Group 3 = mastery.

*$p < .05$. **$p < .01$. ***$p < .001$.

Discussion

To our knowledge, this study is one of the few that considers both teachers' and students' perceptions of three types of motivational climates and their implications on students' achievement goals in PE. As expected, results showed that teachers tend to combine different styles of motivational climate in their teaching practice. It is promising that teachers tend to put forward a mastery motivational climate, meaning that they encourage students to make personal progress and to persevere according to their capacity level. Nevertheless, by trying to motivate their pupils, teachers might encourage them to improve and, at the same time, compare them to their classmates. Teachers can express this comparison in two ways: (1) giving students an indication that they should avoid performing below average or worse than their peers (performance-avoidance)

or (2) encouraging students to surpass others and to try to be the best (performance-approach). In fact, these mixed messages suggest that teachers could benefit from a better understanding of how their students interpret these mixed messages and how these might be detrimental to students' motivation.

Significant differences between teacher and student climate measures indicate that students perceive motivational climate differently than their teachers do. Teachers tendency to overestimate their their own skills relate well to what is usually observed in coaching leadership (Solansky, 2010). In fact, teachers may have responded according to what they thought was best practice instead of what they really did in their PE classes, resulting in a social desirability bias (Donaldson & Grant-Vallone, 2002). These results are congruent with previous findings in PE where the performance climate was not conceptualized in terms of approach and avoidance (Morgan et al., 2005). Nevertheless, the results differed from those observed in a sport study showing moderate relationships between these constructs (Boyce et al., 2009). From our point of view, the competitive environment in which athletes evolve may explain the better cohesion between coaches' and students' perceptions regarding the performance climate, because coaches are possibly more used to evaluating students' performance. In fact, it is plausible that most feedback from coaches is oriented toward the development of abilities to help athletes become the best or, at least, avoid being the worst (e.g., be selected on a basketball team starting five or avoid being on the bench). In the PE context, teachers and students experience or understand performance climates in a different way, even if performance climates and goals are separated into two dimensions (approach and avoidance). From this perspective, PE teachers should be aware of their pupils' perceptions, when they wish to implement performance-oriented teaching approaches. Therefore, it would be helpful for teachers to question students frequently on how they perceive the class climate. For example, teachers could ask their students (verbally or in writing), "In PE, do you feel it is the most important to be the best? To improve? To avoid being below average? What makes you feel this way?" That questioning could occur at the end or beginning of each semester or unit so that teachers are aware of students' needs. They could then adjust their messages according

to students' perceptions and plan for a more appropriately perceived learning environment.

An interesting part of this investigation was the consideration of the potential role of the teacher-induced climate on students' goal adoption mechanism. In this study, we categorized three teacher-induced motivational climates and verified if the predictive value of the student-perceived climate on students' goal adoption differed according to teaching practices. The results revealed that no matter what type of teacher-induced climate, the mastery climate–goals relationship was invariant across the groups. This positive relationship is congruent with what is usually reported in the literature (Barkoukis et al., 2010; Girard et al., 2015; Halvari et al., 2011; Wang et al., 2010). Moreover, such relationships support the hypothesis that suggests that a mastery climate is a key ingredient to its corresponding goals in PE. Nonetheless, it is noteworthy that scores for the mastery climate were high in each cluster, which may have affected the results. In a larger teacher sample, we might have been able to assess the robustness of this relationship with other clusters. The student-perceived performance-approach climate–goals relationship was also invariant, which is coherent with results from antecedent research considering three types of motivational climates (Erturan-İlker & Demirhan, 2012; Papaioannou et al., 2007). These results are encouraging regarding the benefits of *approach* goal adoption for students' engagement and motivation in PE (Papaioannou, Zourbanos, Krommidas, & Ampatzoglou, 2012).

However, we observed some differences regarding relationships between the student-perceived performance (approach and avoidance) climate and students' adoption of performance goals (approach and avoidance). For example, in the mastery/performance-avoidance teacher-induced climate, we observed a nonsignificant contribution of the student-perceived performance-avoidance climate on students' adoption of performance-avoidance goals. That association was significant in the other two combinations of motivational climates, which is in line with past research (Erturan-İlker & Demirhan, 2012). It is interesting that when teachers report a mastery and a performance-avoidance climate, it is only when students perceive a performance-approach climate that they tend to adopt avoidance strategies. Moreover, a significant, positive relationship was

discerned between the student-perceived performance-avoidance climate and performance-approach goal adoption, indicating that even though teachers insist on the importance of avoiding situations where one could fail, it does not necessarily undermine the possibility that students address the task in a positive way and look for success. Nevertheless, that positive contribution was significantly lower in magnitude compared with the other combination of motivational climate.

In the mastery/performance-approach teacher-induced climate, the student-perceived performance-approach climate showed no association with students' adoption of performance-avoidance goals, suggesting that when students perceive that their teachers promote a performance-approach climate, it does not lead to the adoption of performance-avoidance goal adoption. In the other two combinations of teacher-induced climate (mastery/performance-avoidance climate and mastery climate), the small positive association that was present was in line with what was observed in a cohort of Greek adolescents (Papaioannou et al., 2007). Papaioannou, Marsh, and Theodorakis (2004) stated that a combination of both climates (mastery and performance) could be beneficial for students' motivation in PE: "A good teacher can effectively combine a task-involving[3] climate with some aspects of an ego-involving[4] climate such that the effects of the ego-involving climate are positive" (p. 114). Our results reinforce this idea: It seems that the combination of *approach* climates (mastery and performance-approach) could lead students not to pursue avoidance goals when they perceive a performance-approach climate. For PE teachers, this means that using "friendly-rivalry" with self-reference evaluation criteria (Horn & Butt, 2014) or using competition in which personal progression is the focus of the task could be considered promising pedagogical approaches.

Nevertheless, mixed results regarding performance-approach and -avoidance climate–goals relationships might also indicate that performance climate measures could overlap. The low internal consistency of performance-avoidance scales adds to that possibility. It might suggest a lack of understanding from participants regarding the difference between the approach and avoidance constructs. The assessment of the performance-avoidance climate among students

[3] *Task-involving* climate is another designation for *mastery* climate.
[4] *Ego-involving* climate is another designation for *performance* climate.

and teachers represents a research challenge for the future. Another hypothesis might be that other variables interact or mediate these relationships, which could explain goal adoption in PE. For example, it is plausible that perceived competence could act as mediator in the climate–goals relationship (Elliot, 1999), but we did not consider this concept in this study.

Taken together, the results imply that, most of the time, students' perceptions are crucial for predicting their goal adoption in PE. Nevertheless, other factors may affect teachers' and students' perceptions of the motivational climate. For students, past PE and sport experiences and other aspects related to PE achievement (e.g., fitness, motor abilities, attitudes, and beliefs toward PE) might explain how students from the same class perceive the climate differently. As for teachers, their perceptions may also be affected by other variables such as their past sport experiences, their personal beliefs about class management, learning and performance, and their students' ability levels. Therefore, even though PE teachers are responsible for multiple groups of students, they need to consider all individuals with their particularities. Of course, it is not realistic for teachers to adapt their teaching to each of their 30-plus students per class, and it might be discouraging to them. In line with other researchers' recommendations (Ames, 1992; Boyce et al., 2009; Morgan et al., 2005), it is crucial that teachers consider students' perceptions throughout the school year. Moreover, teachers would benefit from training sessions on the dimensions of motivational climate and how to promote a positive motivational climate. From this perspective, they could have a better portrait of their students' motivational orientations and knowingly choose the climate they want to implement for them.

Limitations and Conclusion

Despite its contribution in the PE domain, this study has limitations. First, data collection was based on one wave of assessment. Causality cannot be inferred in this regard. Longitudinal studies could help to better document the evolution of student-perceived and teacher-induced motivational climates. Second, self-reported measures for the teacher-induced motivational climate may not be exact representations of what occurs in classes. In this regard, future research should focus on a more detailed teacher-induced climate assessment. Although beyond the scope of this article, observational

measures and interviews with teachers might clarify these relationships. Smith, Quested, Appleton, and Duda have recommended (2016) such an approach that could serve as a framework for further studies. Third, this study was conducted in the province of Quebec. In this context, PE is mandatory at the high school level. Such context may affect students' perceptions and their teachers' pedagogical approaches. From this perspective, generalization of the results to other populations is limited. Comparative studies between different populations could verify if the climate–goals relationship varies across multiple subgroups.

In summary, this study enhances understanding of the factors underlying achievement goal adoption in high school PE. Being aware that they might induce a different motivational climate, depending on the students they are addressing—and acknowledging that each student might perceive the climate in his or her own way—could help teachers adjust their practices to foster goals that are beneficial for students' motivation and engagement.

References

Ames, C. (1992). Classroom: Goals, structures, and student motivation. *Journal of Educational Psychology, 84*, 261–271. https://doi.org/10.1037/0022-0663.84.3.261

Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology, 80*, 260–267. https://doi.org/10.1037/0022-0663.80.3.260

Baril, G., Paquette, M. C., & Ouimet, A. M. (2014). *Ados 12-14: les dimensions socioculturelles des pratiques alimentaires et d'activité physique des adolescents* (No. de publication 1773) [Teens 12–14: The sociocultural dimensions of eating habits and physical activity practice of adolescents]. Québec, Canada: Institut national de santé publique du Québec.

Barkoukis, V., Ntoumanis, N., & Thøgersen-Ntoumani, C. (2010). Developmental changes in achievement motivation and affect in physical education: Growth trajectories and demographic differences. *Psychology of Sport and Exercise, 11*(2), 83–90. https://doi.org/10.1016/j.psychsport.2009.04.008

Boyce, B. A., Gano-Overway, L. A., & Campbell, A. L. (2009). Perceived motivational climate's influence on goal orientations, perceived competence, and practice strategies across the athletic season. *Journal of Applied Sport Psychology, 21*, 381–394. https://doi.org/10.1080/10413200903204887

Byrne, B. M. (2010). *Structural equation modeling with AMOS: Basic concepts, applications, and programming* (2nd ed.). Ottawa, Canada: Routledge.

Cox, A. E., Smith, A. L., & Williams, L. (2008). Change in physical education motivation and physical activity behavior during middle school. *Journal of Adolescent Health, 43*, 506–513. https://doi.org/10.1016/j.jadohealth.2008.04.020

Donaldson, S. I., & Grant-Vallone, E. J. (2002). Understanding self-report bias on organizational behavior research. *Journal of Business and Psychology*, *17*, 245–260. https://doi.org/10.1023/A:1019637632584

Elliot, A. J. (1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist, 34*, 169–189. https://doi.org/10.1207/s15326985ep3403_3

Elliot, A. J., & Church, M. A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology, 72*, 218–232. https://doi.org/10.1037/0022-3514.72.1.218

Erturan-İlker, G. (2014). Effects of feedback on achievement goals and perceived motivational climate in physical education. *Issues in Educational Research, 24*, 152–161.

Erturan-İlker, G., & Demirhan, G. (2012). The effects of different motivational climates on students' achievement goals, motivational strategies, and attitudes toward physical education. *Educational Psychology, 33*(1), 59–74. https://doi.org/10.1080/01443410.2012.707613

Fontayne, P., & Bohuon, A. (2011). Culture sportive et genre [Sport culture and gender]. In M. Travert & N. Mascret (Eds.), *La culture sportive* (pp. 47–61). Paris, France: Édition Revue EPS.

Garn, A. C., Ware, D. R., & Solmon, M. A. (2011). Student engagement in high school physical education: Do social motivation orientations matter? *Journal of Teaching in Physical Education, 30*, 84–98. https://doi.org/10.1123/jtpe.30.1.84

Girard, S., Chouinard, R., & St-Amand, J. (2015). Climat motivationnel et buts de maîtrise en éducation physique: rôle modérateur du sexe et du sentiment de compétence [Motivational climate and mastery goals in physical education: Interaction with gender and perceived competence]. *Revue phénEPS / PHEnex Journal, 7*(1), 1–20.

Halvari, H., Skjesol, K., & Bagøien, T. E. (2011). Motivational climates, achievement goals, and physical education outcomes: A longitudinal test of achievement goal theory. *Scandinavian Journal of Educational Research, 55*(1), 79–104. https://doi.org/10.1080/00313831.2011.539855

Harter, S., & Connell, J. P. (1984). A model of children's achievement and related self-perceptions of competence, control, and motivational orientation. *Advances in Motivation and Achievement, 3*, 219–250.

Harwood, C. G., Keegan, R. J., Smith, J. M., & Raine, A. S. (2015). A systematic review of the intrapersonal correlates of motivational climate perceptions in sport and physical activity. *Psychology of Sport and Exercise, 18*, 9–25. https://doi.org/10.1016/j.psychsport.2014.11.005

Horn, T. S., & Butt, J. (2014). Developmental perspectives on sport and physical activity participation. In A. Papaioannou & D. Hackfort (Eds.), *Routledge companion to sport and exercise psychology: Global perspectives and fundamental concepts* (pp. 3–21). New York, NY: Routledge.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

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*, 1–16. https://doi.org/10.1186/1479-5868-7-40

Jöreskog, K. G., & Sörbom, D. (1996). *LISREL 8: User's reference guide.* Chicago, IL: Scientific Software International.

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York, NY: Guilford Press.

Maehr, M. L. (1984). Meaning and motivation: Toward a theory of personal investment. In R. E. Ames & C. Ames (Eds.), *Research on motivation in education* (Vol. 1, pp. 115–144). New York, NY: Academic Press.

Morgan, K., Sproule, J., Weigand, D., & Carpenter, P. (2005). A computer-based observational assessment of the teaching behaviours that influence motivational climate in physical education. *Physical Education and Sport Pedagogy, 10*(1), 83–105. https://doi.org/10.1080/1740898042000334926

Ommundsen, Y. (2006). Pupils' self-regulation in physical education: The role of motivational climates and differential achievement goals. *European Physical Education Review, 12*, 289–315. https://doi.org/10.1177/1356336X06069275

Papaioannou, A., Marsh, H. W., & Theodorakis, Y. (2004). A multilevel approach to motivational climate in physical education and sport settings: An individual or a group level construct? *Journal of Sport and Exercise Psychology, 26*(1), 90–118. https://doi.org/10.1123/jsep.26.1.90

Papaioannou, A., Milosis, D., Kosmidou, E., & Tsigilis, N. (2007). Motivational climate and achievement goals at the situational level of generality. *Journal of Applied Sport Psychology, 19*(1), 38–66. https://doi.org/10.1080/10413200601113778

Papaioannou, A., Zourbanos, N., Krommidas, C., & Ampatzoglou, G. (2012). The place of achievement goals in the social context of sport: A comparison of Nicholls' and Elliot's model. In G. C. Roberts & D. C. Treasure (Eds.), *Advances in motivation in sports and exercise* (3rd ed., pp. 59–90). Champaign, IL: Human Kinetics.

Sarrazin, P., Tessier, D., & Trouilloud, D. (2006). Climat motivationnel instauré par l'enseignant et implication des élèves en classe: l'état des recherches [Motivational climate induced by teachers and students' involvement: The state of research]. *Revue française de pédagogie, 157*, 147–177. https://doi.org/10.4000/rfp.463

Smith, N., Quested, E., Appleton, P. R., & Duda, J. L. (2016). A review of observational instruments to assess the motivational environment in sport and physical education settings. *International Review of Sport and Exercise Psychology, 9*(1), 134–159. https://doi.org/10.1080/1750984X.2015.1132334

Solansky, S. T. (2010). The evaluation of two key leadership development program components: Leadership skills assessment and leadership mentoring. *Leadership Quarterly*, *21*, 675–681. https://doi.org/10.1016/j.leaqua.2010.06.009

Spray, C. M., Warburton, V. E., & Stebbings, J. (2013). Change in physical self-perceptions across the transition to secondary school: Relationships with perceived teacher-emphasised achievement goals in physical education. *Psychology of Sport and Exercise, 14*, 662–669. https://doi.org/10.1016/j.psychsport.2013.05.001

Tremblay, M. S., Shields, M., Laviolette, M., Craig, C. L., Janssen, I., & Connor Gorber, S. (2010). *Condition physique des enfants et des jeunes au Canad : résultats de l'Enquête canadienne sur les mesures de la santé de 2007-2009* (Rapports sur la santé no. 82-003-X) [Physical fitness of children and youth in Canada: Results from the 2007–2009 Canadian Health Measures Survey]. Ottawa, Canada: Statistique Canada.

Trouilloud, D. (2015). *L'engagement dans les activités physiques en contextes éducatif, sportif, et thérapeutique : Rôle des cognitions sociales, des déterminants motivationnels, et du climat instauré par l'environnement social* (Habilitation à Diriger des Recherches) [Engagement in physical activities in educational, sporting and therapeutic contexts: Role of social cognitions, motivational determinants, and the climate created by the social environment]. Grenoble, France: Université de Grenoble.

Wang, C. K., Liu, W. C., Chatzisarantis, N. L., & Lim, C. B. (2010). Influence of perceived motivational climate on achievement goals in physical education: A structural equation mixture modeling analysis. *Journal of Sport and Exercise Psychology, 32*, 324–338. https://doi.org/10.1123/jsep.32.3.324

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YOU AND THE LAW

Assuming the Risk of Open and Obvious Dangers of Climbing Gyms

Ryan Zwart and Sarah J. Young

McGarry v. Philly Rock Corp.
134 A.3d 97 (2015)

Facts of the Case

On March 16, 2011, Rebecca McGarry and her husband, Peter, went to the Philly Rock Corp. (PRC) indoor climbing gym where they had twice climbed previously. When the McGarrys first visited they were asked to sign a waiver, which outlined the risks and dangers associated with indoor rock climbing. This legal document released PRC from liability regarding any injuries the couple may sustain while climbing at the facility. The couple's signatures implied the McGarrys understood the risks and were willing to assume those risks to engage in the activity. During their first visit, March 5, 2011, the couple received instruction on the proper operation of the safety equipment the facility used for top-rope climbing. Top-rope refers to the manner in which the rope is situated in this particular climbing setup. Both ends of the rope come down on either side of the anchor positioned at the top of the climb with the belayer attached to one end and the climber on the other. On March 16, the couple decided to try bouldering, a style of climbing lower to the ground in which the climber uses bouldering pads instead of ropes, harnesses, and belay devices. Bouldering started as a way for rock climbers to practice

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techniques and improve strength using less gear. Consequently, this style of climbing quickly rose in popularity because of increased accessibility and fewer concerns for participants who have a fear of heights.

After watching her husband climb the bouldering wall, Rebecca McGarry took a turn. After climbing about 4 feet up the wall, McGarry let go of the wall and jumped to the ground. When she hit the ground, she rolled her ankle and heard a cracking, crunching noise. Peter had moved a bouldering pad under her next to another pad; however, her foot landed between the two pads. As a result of the fall, McGarry broke her ankle, which required several surgeries and more than a year of physical therapy to recover fully.

The Complaint

McGarry claimed that PRC was grossly negligent in their duty to instruct her in the proper way to use the bouldering wall and failed to warn of the dangers of using the bouldering wall. Because McGarry had signed a release of liability for ordinary negligence, she was required to prove gross negligence in this case. McGarry supported her allegation by claiming that neither she nor her husband had received any instruction on how to use the bouldering wall. While PRC did not require bouldering instruction, they did have signs suggesting that users inquire with staff for any questions associated with use of the bouldering area. McGarry claimed that it was not reasonable to expect patrons to approach staff to instruct them how to use the bouldering wall and instead should require instruction and training before a climber uses that area of the facility.

Findings of the Case

At the trial court level, the jury agreed with McGarry, finding PRC grossly negligent in contributing to McGarry's injuries and 50% at fault. The jury also ruled that McGarry contributed to her own injury by deliberately jumping off the wall and was found 50% at fault. Based on this ruling, McGarry was awarded $150,000 in damages.

PRC filed an appeal in the form of a post-trial motion of judgment notwithstanding the verdict (JNOV) on a number of procedural issues and legal claims. According to *Black's Law Dictionary* (Garner, 2014), JNOV is a "judgment entered for one party even

though a jury verdict has been rendered for the opposing party" (p. 972). The primary issue PRC claimed in their request to the court was that the jury had ruled in error because McGarry had not proven PRC was grossly negligent. In review, the judge agreed plaintiff's evidence did not rise to the level of proving gross negligence, that she assumed the risk of injury from the inherent risks of bouldering, and entered a JNOV in PRC's favor. As a result, McGarry appealed on two main legal issues: gross negligence and against assumption of risk. McGarry persisted in her argument that PRC was grossly negligent supported by the facts that (1) there was no instruction on how to use the bouldering pads or how best to descend the wall and (2) there was no signage cautioning users to be careful when using the facility nor instruction for them on how to use the facility safely. Further, McGarry's argument to the appeals court was that because she was claiming gross negligence, the assumption of risk doctrine should not apply. McGarry claimed that because of PRC's failures, she was unable to appreciate the risks of bouldering and therefore was unable to assume its inherent risks.

To address the claims, the appellate court examined the obligations and expectations between business owners and invitees on their property. PRC argued the precedent set by *Zeidman vs. Fisher* (2009) regarding business invitees and service providers' duties to protect them. In *Zeidman*, the plaintiff hit a tee shot on a golf course and then drove out on a golf cart to make sure that the previous group was clear of the area before the rest of the party also teed off. When he had concluded the previous group was far enough away, he then motioned for the other players to tee off as he made his way back to the tee area. As he was making his way back, the defendant hit an errant tee shot that struck the plaintiff and caused serious and permanent injuries. According to this case the court ruled,

When an invitee enters business premises, discovers dangerous conditions which are both obvious and avoidable, and nevertheless proceeds voluntarily to encounter them, the doctrine of assumption of risk operates merely as a counterpart to the possessor's lack of duty to protect the invitee from those risks. (*Zeidman vs. Fisher,* 2009, p. 642)

In *Zeidman*, the plaintiff understood the dangers of going out onto the golf course when others from the group may be teeing off.

By being on the course, the plaintiff had assumed the risks associated with the activity. Similarly in the case at hand, the plaintiff understood the dangers inherent to rock climbing and by participating assumed those risks. While the defendant had a duty to protect patrons and provide reasonable mitigation of risks inherent to indoor climbing, when a patron realizes or observes a danger that is open and obvious, yet decides to participate anyway, it is implied the individual assumed the risk, which alleviates the premises owner of liability.

The Verdict

The appellate court ruled that the assumption of risk doctrine barred the plaintiff's recovery and superseded her claim of whether the defendant was grossly negligent. As a result, the defendant was found not liable for the plaintiff's injuries.

Implications

This case provides several examples of risk management implications relevant to climbing facility managers and owners for patrons at their bouldering walls. While the facility in this case was not found liable for the plaintiff's injuries, careful adherence to the following suggestions offers increased protection of facility patrons and provides further protection for facility operators in the event of future claims. Grady (2017) suggests six legal obligations required of property owners and operators. First, owners and operators must regularly inspect the premises to determine both open and obvious dangers, as well as hidden dangers. Prior to opening a climbing gym, trained staff should perform daily inspections of bouldering pads, holds, surfaces, and equipment, while certified professionals should inspect anchor systems and the structural integrity of the wall surface and supporting frame. Most climbing wall manufacturers will do these inspections as part of the construction contract and suggest that facilities have the manufacturer conduct major maintenance on the structure and safety systems. Second, owners have an obligation to maintain and repair the premises. In *McGarry*, this might have meant more bouldering pads sufficiently large enough for the landing area or, better yet, installation of a new pad surface with no seams, a standard design practice in many modern bouldering gyms. Third, operators have an obligation to warn of concealed dangers. In this case, specifically informing patrons about the dangers

of having space between the bouldering pads and how one might protect a climber if there is a space. Fourth, as the PRC did in the case at hand, owners must advise of inherent risks to participating in the activity, such as the possibility of falling from heights, other climbers falling, and injuries, such as sprains, strains, fractures, cuts, scrapes, or dislocations. Fifth, managers and operators should hire competent and qualified staff who are able to recognize and assist new participants to the facility. In the case at hand, had the plaintiffs received an orientation to the bouldering area, they would have had even less standing in a legal case. Sixth, it is the owners' responsibility to design facilities that meet or exceed safety requirements. Climbing gyms are now constructing their facilities so situations like the one in this case are less likely to occur. One of the contributing factors to this incident was that the spotter (plaintiff's husband) was not experienced in using proper spotting techniques or bouldering pad placement. Climbing facilities have developed new designs to help mitigate this risk; most new gyms install a thick padded floor that completely surrounds the bouldering wall and is level without spaces between the padding. This minimizes the opportunity for moving the pads and for an awkward fall like the one plaintiff suffered in this case.

One of the main complaints in this case was that McGarry did not receive any instruction on how to use the bouldering area properly, which should have included topics such as how to properly move bouldering pads, how to spot and protect climbers, and how to descend the wall. The key lesson learned from this case is the need for climbing facilities to provide instruction or an orientation for every part of the facility that patrons may use. Often climbing gyms focus on the roped climbing areas, due to severity of the consequence if a mistake is made, and tend to rush through the bouldering area orientation. Yet a significant number of climbing facility accidents and injuries can occur in the bouldering area (Schöffl, Hoffmann, & Küpper, 2013). Clear, thorough instructions on how to use these areas may assist in lowering injury rates or at the least increase protection of the facility if participants take legal action.

References

Garner, B. A. (Ed.). (2014). *Black's law dictionary* (10th ed.). St. Paul, MN: Thomson Reuters.

Grady, J. (2017). Premises liability. In D. J. Cotten & J. T. Wolohan (7th ed.), *Law for recreation and sport managers* (pp. 129–138). Dubuque, IA: Kendall Hunt.

Schöffl, V. R., Hoffmann, G., & Küpper, T. (2013). Acute injury risk and severity in indoor climbing—A prospective analysis of 515,337 indoor climbing wall visits in 5 years. *Wilderness and Environmental Medicine, 24*, 187–194. https://doi.org/10.1016/j.wem.2013.03.020

Zeidman v. Fisher, 980 A.2d 637 (2009).

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YOU AND THE LAW

When Fandom Ends and Harassment Begins

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Donnelly v. University of North Carolina
Court of Appeals of North Carolina 236 N.C. App. 32
September 2, 2014

University of North Carolina (UNC) graduate John Donnelly (Petitioner) filed a petition in North Carolina's Superior Court to review UNC's Notice of Trespass banning him from entering university athletic facilities indefinitely after UNC (Respondent) determined Donnelly had exhibited a history of harassment. Petitioner unsuccessfully appealed the case through UNC's appeals process, which resulted in a Final University Decision to uphold the Notice of Trespass. Following his appeal to the UNC Department of Public Safety, Donnelly filed in North Carolina's Superior Court a legal complaint arguing his First Amendment rights had been violated. After the superior court upheld UNC's indefinite ban, Donnelly appealed to the North Carolina Court of Appeals. Under consideration was the type of speech protected by the First Amendment and whether UNC acted appropriately in issuing the indefinite ban to Donnelly.

Facts of the Case

During a 6-year period, Donnelly was engaged in a series of incidents involving inappropriate behavior directed toward UNC athletes and their families, and UNC staff. The inappropriate

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behavior included sexually suggestive comments; appearing at the soccer team's hotel while attending an away match; and harassing players, fans, and players' family members during games. Donnelly also harassed UNC staff by calling the athletics offices up to 13 times a day. This conduct began while petitioner acted as a volunteer usher for UNC during the 2006 football season and continued while a patron of UNC athletics.

The incident that led to the indefinite ban occurred at the Women's Soccer College Cup, held in San Diego from November 9 to December 2, 2012. After previously attempting to contact multiple soccer players on Facebook and in person, Donnelly discovered where the team would be staying while in San Diego. Donnelly claimed that he uncovered this information because "he won an autographed soccer ball and could not locate the head coach's signature on the ball" and wished to contact him to obtain that signature (*Donnelly v. University of North Carolina*, 2014). Donnelly's presence became uncomfortable for players and parents alike due to his attempts to contact various team members. At this point, Donnelly was asked to leave the hotel and did so without incident.

On December 3, 2012, UNC issued to Donnelly a Notice of Trespass related to the incidents occurring against players, fans, family, and UNC staff. The Notice of Trespass informed petitioner of his indefinite prohibition from entering UNC athletic facilities. George Hare, deputy chief of the UNC Department of Public Safety, called petitioner 1 week later to inform him of the Notice of Trespass, explain the details, and notify Donnelly of his right to appeal.

Case History

Donnelly appealed the Notice of Trespass with the UNC Department of Public Safety. On March 7, 2013, Hare issued a Final University Decision upholding the Notice of Trespass, ending Donnelly's process of appeal with UNC. On April 4, 2013, Donnelly filed a Petition for Review asking the Superior Court of Iredell County to review the Final University Decision barring him from UNC athletic facilities. The superior court judge found that "no substantial rights of the petitioner have been prejudiced and that the final decision of the University should be affirmed" (*Donnelly v. University of North Carolina*, 2014). Subsequently, Donnelly filed an appeal in the North Carolina Court of Appeals.

Case Analysis

In his appeal, Donnelly presented three arguments against UNC's ruling: (1) violation of his First Amendment right to free speech; (2) violation of N.C. Gen. Stat. § 150B-51, alleging UNC's decision was arbitrary, capricious, and unsupported by substantial evidence; and (3) retaliation by UNC officials through the indefinite ban.

In his first argument, Donnelly contended that banning him from future athletic contests infringed on his First Amendment right to free speech. When confronted with a First Amendment claim, the court must first determine "whether the plaintiff has engaged in 'protected speech'" (*Goulart v. Meadows,* 2002). Citing *Thorne v. Bailey* (1988), the court noted that "harassment is not protected speech." Donnelly's acts were determined to constitute harassment toward athletes, family members, and UNC staff, and were not a particularized message; therefore, the behavior was not protected by the First Amendment.

The petitioner's second argument asserted UNC's ban was arbitrary, capricious, and unsupported by substantial evidence (N.C. Gen. Stat. § 150B-51, 2011). The court defined substantial evidence as "relevant evidence a reasonable mind might accept as adequate to support a conclusion" (*Donnelly v. University of North Carolina*, 2014). UNC argued their decision was not based on a single incident, but on a track record of 6 years of progressive incidents, with prior reprimands served. In the Final University Decision, UNC outlined all events that led to the petitioner's permanent ban. The court found no evidence of unreasonable action.

As a part of his second argument, petitioner also argued that proper procedure for the General Order was not adhered to as multiple lines of the Notice of Trespass were left blank. The court noted that the goals of the UNC Department of Public Safety's General Order on trespass warnings (informing the trespasser of the restrictions and his right to appeal) were both met even with nominal missing information. UNC was forced to make minor adjustments to their normal notification procedure as the offending incident took place off campus. The court dismissed Donnelly's second argument, finding UNC's procedural error harmless and immaterial.

Finally, the petitioner claimed misuse of power by UNC officials in their retaliation against him by enforcing the indefinite ban.

Petitioner cited *Trulock v. Freeh* (2001), which states public officials are "prohibited from retaliating against individuals who criticize them." The court determined the current case does not involve criticism of government officials, and therefore, a correlation between the two cases cannot be made. For the aforementioned reasons, the court of appeals affirmed the judgment of the lower court.

Discussion

The court of appeals held that (1) Donnelly's speech was not protected by the First Amendment; (2) the university's decision to ban Donnelly indefinitely was not arbitrary, capricious, or unsupported by substantial evidence; and (3) any procedural error committed by the university in the Notice of Trespass was harmless and immaterial. In his concurring opinion, one judge wrote that the majority missed an opportunity to fully apply the *O'Brien* test (*United States v. O'Brien*, 1968). The four-pronged *O'Brien* test determines whether the regulation of a state actor, limiting a course of conduct involving speech, infringes upon the constitutional rights of those involved. The four prongs include

> (1) a government regulation is sufficiently justified if it is within the constitutional power of the government, (2) if it furthers an important or substantial governmental interest, (3) if the governmental interest is unrelated to the suppression of free expression, and (4) the incidental restriction on alleged First Amendment freedoms is no greater than is essential to the furtherance of that interest. (*United States v. O'Brien*, 1968)

The judge noted that UNC administrators' powers clearly fell under the first two prongs, as they have the power to ban an attendee and their "substantial interest" is in providing a safe atmosphere for students. UNC met the third prong, as their interest is the protection of students, not the elimination of Donnelly's free speech. As previous attempts of curtailing Donnelly's actions proved unsuccessful, the fourth prong was met when "the restrictions placed on Donnelly" were not greater than UNC's interests of public safety. In the end, it was determined that UNC was within their bounds to take action against a fan whose behaviors had been deemed unacceptable for a substantial period of time.

Implications

Player and fan safety should be paramount to those managing sporting events and facilities at all levels, from youth and recreational leagues up through professional sport. Facilities and event managers are tasked with providing a safe atmosphere for players and fans alike. "Fan" is short for "fanatic" for a reason; sporting events present an avenue for patrons to express their fandom in extraordinary ways. A fan may be loud, boisterous, and even aggressive. Heckling and offensive language is often protected by the Supreme Court, limiting sport practitioners to "request civility from fans rather than demand censorship" (Calvert & Richards, 2004, p. 6). Facilities and event managers could look to mitigate potentially dangerous situations in the following ways:

- Instituting a Fan Code of Conduct (e.g., National Collegiate Athletic Association, 2016). Having a code of conduct outlined for fans provides all attendees a clear understanding of permitted behavior and penalties for failing to adhere to that behavior.
- Having reminders of expected behaviors and consequences of failing to meet those expectations. Reminders should be posted in multiple places, such as disclaimers on tickets, facilities websites, in-game announcements, posters throughout the facility, and direct contact with facility personnel. Protocol for removing patrons from the premises should be followed.
- Limiting alcohol sales through strategies such as checking identification of patrons, only allowing an individual to purchase a limited amount of alcohol, halting the sale of alcohol at a predetermined time, and cutting off intoxicated patrons (Lenk et al., 2010).
- Effectively communicating issued citations. Sport practitioners should adhere to due process procedures when issuing citations, such as providing an opportunity for patrons to ask questions regarding the citation and to appeal if necessary.

Harassment, along with inciting fear or engaging in illegal behavior, warrants no constitutional protection due to the substantial governmental interest of public safety. However, it is critical for

facility personnel to recognize that cheering for the opposition and offensive language receive protection under the First Amendment. Guidelines such as these can help create an environment where fans are welcome to cheer for whomever they like, while providing officials an avenue for curtailing unacceptable behavior.

References

Calvert, C., & Richards, R. D. (2004). Fans and the First Amendment: Cheering and jeering in college sports. *Virginia Sports and Entertainment Law Journal*, *4*(1), 1–53.

Donnelly v. University of North Carolina, 2013 WL 8595244 (2014).

Goulart v. Meadows, 220 F. Supp. 2d 494 (D. Md. 2002).

Lenk, K. M., Toomey, T. L., Erickson, D. J., Kilian, G. R., Nelson, T. F., & Fabian, L. E. A. (2010). Alcohol control policies and practices at professional sports stadiums. *Public Health Reports, 125*, 665–673. https://doi.org/10.1177/003335491012500508

National Collegiate Athletic Association. (2016). *RESPECT: Guide for planning and implementing a sportsmanship program*. Retrieved from http://ncaa.s3.amazonaws.com/files/sportsmanship/guide-planning-impl-sportsmanship-prog-20160711.pdf

N.C. Gen. Stat. § 150B-51 (2011).

Thorne v. Bailey, 846 F.2d 241 (1988).

Trulock v. Freeh, 289 F.3d 829 (2001).

United States v. O'Brien, 391 U.S. 367 (*1968*).

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