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FITNESS

Effect of a Two-Sessions-Per-Week Stretching Program on Hamstring Extensibility in Latino High School Students

Grant M. Hill and Wendy Najera

Abstract

This study explored the effectiveness of a stretching program on hamstring extensibility among Latino high school students in a physical education (PE) setting. Students, aged 13 to 15, in five required PE classes were assigned to either an experimental group (n = 60) or a control group (n = 42). Experimental students performed a 3-min stretching program twice a week for 9 weeks. Participants hamstring extensibility was recorded at baseline, in the middle (Week 5), and at the end (Week 9) of the stretching intervention program via the FitnessGram sit-and-reach test . The results of t tests revealed a significant improvement for the experimental group from pretest to posttest ($p < .002$), from posttest to retest ($p < .03$), and from pretest to retest ($p < .0004$). In contrast, no significant differences were found for the control group ($p > .05$). The results suggest PE teachers can improve student hamstring extensibility by incorporating a 3-min, twice-a-week stretching program.

Flexibility is an important component of health-related physical fitness (Centers for Disease Control and Prevention, 2011). However, a large number of school children have inadequate hamstring

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extensibility, which has been linked to neck tension and lower back pain in adults and to increased incidence of herniated disks (Coledam et al., 2012; Mayorga-Vega, Merino-Marban, Garrido, & Viciana, 2014; Mayorga-Vega, Merino-Marban, Vera-Estrada, & Viciana, 2014; Santonja et al., 2007). In contrast, children with adequate hamstring extensibility have demonstrated less likelihood of pelvic/spinal postural disorders (De Lemos et al., 2012; Lopez-Minarro &Alacid, 2010; Muyor et al., 2012).

According to Rodriguez et al. (2008), loss of hamstring extensibility begins to occur during the prepubertal period and increases during later growth stages. This decline appears to be related to increased musculotendinous stiffness around the joint, due to faster bone development and growth compared to the muscle (Micheli, 1983). The recent decline in hamstring extensibility can be attributed to a physically inactive lifestyle in which children prefer watching television, playing video games, and other nonactive activities (Rodriguez et al., 2008).

A flexibility program in a physical education (PE) setting can improve hamstring extensibility and reduce the incidence of lower back pain (Coledam et al., 2012; Mayorga-Vega, Merino-Marban, Garrido, & Viciana, 2014; Mayorga-Vega, Merino-Marban, Vera-Estrada, & Viciana, 2014; Kamandulis et al., 2013; Merino-Marban et al., 2015; Sanchez Rivas et al., 2014). Consequently, experts have recommended PE programs offer students a regular program of stretching exercises (Mayorga-Vega et al., 2017). Rodriguez et al. (2008) found that both elementary school children and secondary school children achieved significant increases in sit-and-reach scores following a 5-min stretching program performed during the warm-up and cooldown sessions of PE class.

Stretching programs have also been shown to be more effective when they are more frequent. Mayorga-Vega, Merino-Marban, Garrido, and Viciana (2014) found that third graders achieved significant improvements in sit-and-reach scores over 32 weeks that involved stretching sessions of just 3 min, once a week. Santonja et al. (2007) found that students who performed 5 min of hamstring stretches in both a PE class twice a week and an extracurricular activity program achieved significantly greater gains than those who just performed the stretches in a PE class.

Because past studies have confirmed the benefits of stretching programs in various youth populations, a study was deemed important to determine whether a twice-a-week stretching program as short in duration as 9 weeks could improve hamstring extensibility among male and female Latino high school PE students. Limiting the study to Latino high school students may make important generalizations possible. In addition, assessing hamstring extensibility at baseline, at 5 weeks, and again at 9 weeks may make it possible to determine whether improvements in hamstring extensibility occur incrementally, over time, for both boys and girls. Finally, since the average BMI of the participants in this study was in the Needs Improvement Zone of the FitnessGram, comparisons of the results with studies utilizing participants with healthier BMI levels might be possible.

Method

This study used an experimental design with two control groups and three experimental group classes, all taught by the same instructor at one public charter high school in the Southwestern United States. The study was conducted from January to March 2018 with the permission of the school district IRB official. Participants included 53 male and 49 female ninth graders. All the students indicated their race/ethnicity was Latino. Prior to the stretching intervention program, students were asked which sports they participated in, as well as the number of days and average time per session. Height and weight were each taken twice and the average measurement was used (International Society for the Advancement of Kinanthropometry, 2001).

During each intervention session, the experimental group students performed static hamstring stretches for 3 min during the cooldown period, using the same protocol as used in Mayorga-Vega, Merino-Marban, Garrido, and Viciana (2014). Four stretching exercises were alternated during the intervention program: (a) standing with feet together, (b) sitting with feet together, (c) standing with feet shoulder width apart, and (d) sitting with feet shoulder width apart. During the stretching exercises, students flexed forward their bodies at the hip, trying to maintain the spine in neutral position as much as possible until a gentle stretch was felt in the hamstrings. The knees were fully extended and toes pointed to the ceiling with no hip

rotation. The stretched positions were held gently until the end point of the range was reached (i.e., stretch to the point at which tightness of the hamstring muscles, but no pain was felt). Once this position was achieved, students held each stretch for 20 s.

Hamstring extensibility was measured using the FitnessGram sit-and-reach test prior to the start (baseline), at the middle (Week 5), and at the end (Week 9) of the 9-week intervention stretching program. The same tester administered the sit-and-reach test using a plastic box with a scale printed in inches and centimeters on top. In addition, the test was performed under similar environmental conditions in all five classes. Students were asked to refrain from any strenuous physical activity 48 hr prior to the test date; the test was executed on the same day of the week for each participant. Two trials were performed and the average was recorded (Mayorga-Vega et al., 2015).

Scores were entered into a spreadsheet. Descriptive statistics (means and standard deviation) for body weight, body height, BMI, and baseline sit-and-reach scores were calculated. A *t* test determined if any significant differences occurred over the 9-week period for sit-and-reach scores for any of the classes.

Results

Table 1 shows students' general characteristics. Of the 102 students in the study, 53 (51.9%) were male and 49 (48.1%) were female. The results of the one-way analysis of variance determined there were no statistically significant differences in the anthropometric measures (body mass, body height, BMI, sit-and-reach baseline values) between the control group and the experimental group ($p > .05$).

Table 2 shows the effect of the hamstring extensibility stretching intervention program on sit-and-reach scores. The *t* test results indicated a statistically significant improvement for the experimental group from pretest to Week 5 ($p < 0.002$), from Week 5 to Week 9 ($p < .03$), and from pretest to Week 9 ($p < .000$). In contrast, no significant differences were found for the scores of the control group ($p > .05$). The *t* test results demonstrated a significant improvement for the female participants from pretest to Week 5 ($p < .03$) and from Week 5 to Week 9 ($p < .004$). The *t* test results for males demonstrated a significant difference from pretest to Week 5 ($p < .006$) but no significant difference from Week 5 to Week 9 ($p > .05$).

Table 1
Demographic Data for Hispanic High School Students Enrolled in Required Physical Education Classes

Demographic data	Total (N = 102)	Experimental (n = 60)	Control (n = 42)
Body height (m), $M \pm SD$	1.62 ± 0.08	1.62 ± 0.08	1.62 ± 0.07
Body mass (kg), $M \pm SD$	70.06 ± 20.33	71.28 ± 22.92	68.33 ± 16.03
Body mass index (kg/m^2), $M \pm SD$	26.35 ± 7.02	26.79 ± 7.85	25.71 ± 5.64
Gender (boys/girls)	53/49	29/31	24/18
Extracurricular (yes/no)	5/97	3/57	2/40
Sit-and-reach score (cm), $M \pm SD$	21.51 ± 4.76	22.69 ± 4.3	19.83 ± 4.93

Table 2
Means and Standard Deviations of Sit-and-Reach Scores for Hispanic High School Students Enrolled in Required Physical Education Classes

Group	Pretest (1) $M \pm SD$	Week 5 (2) $M \pm SD$	Week 9 (3) $M \pm SD$
Experimental (n = 60)	22.69 ± 4.3	24.20 ± 3.65^{t}	25.69 ± 5.67$^{\wedge *}$
Girls EG (n = 31)	23.51 ± 4.63	25.13 ± 3.82^{t}	27.10 ± 4.18$^{\wedge *}$
Boys EG (n = 29)	21.80 ± 3.81	23.21 ± 3.23^{t}	23.64 ± 6.37*
Control (n = 42)	19.83 ± 4.93	19.29 ± 4.54	18.50 ± 5.50

^{t} $p < 0.05$ Pretest to Week 5 gain. $^{\wedge}$ $p < 0.05$ Week 5 to Week 9 gain. * $p < 0.05$ Pretest to Week 9 gain.

Discussion

The findings indicate that a PE-based stretching program on hamstring extensibility performed for 3 min/session, twice a week for 9 weeks significantly improved hamstring extensibility. These findings are consistent with those of studies of a comparable length in which primary school children who performed a PE-based stretching program experienced a significant improvement in hamstring extensibility (Mayorga-Vega, Merino-Marban, Garrido, & Viciana, 2014; Mayorga-Vega et al., 2017; Mayorga-Vega, Merino-Marban, Vera-Estrada, & Viciana, 2014; Merino-Marban et al., 2015; Rodriguez et al., 2008). It is important to note that while all 97 of the high school students in this study were enrolled in a required PE

class, only 5% reported concurrently participating on an interscholastic athletic team.

The improvements in hamstring flexibility appeared to be incremental for the experimental group, particularly for the females. Because the scores increased steadily over the 9 weeks for the experimental group classes, it is likely that greater gains would have been achieved had the frequency been increased from twice a week (Rodriguez et al., 2008; Santonja et al., 2007).

The lack of improvement for the control group is not surprising and illustrates the inadequacy of most PE programs in regard to enhancing hamstring flexibility. Similar to the experimental group, the control group also participated in a standardized warm-up, which allowed adequate muscular temperature prior to the three hamstring flexibility testing sessions during the 9 weeks; however, they did not participate in the twice-a-week flexibility sessions.

Females generally achieved better hamstring flexibility scores than males did. This finding is not surprising since studies have shown that females have greater hip flexibility (Mier & Shapiro, 2013); consequently, it is assumed that females will score better than males on the sit-and-reach test since there is a positive correlation between flexibility and exercises that involve the hip region.

A limitation of the present study is the small, nonrandomized sample size. The study was conducted in a small charter high school in the Southwestern United States. The school has a population of 230 students, of whom 115 are in the ninth grade. The relatively high average BMI (26.35) of the students was in the Needs Improvement category for the FitnessGram, with many of the students in the NI-Health Risk category. A study of students of a similar age by Arora et al. (2013) demonstrated a weak correlation between BMI and hamstring flexibility, and other studies involving Sumo wrestlers with high BMIs have found similar results (Alter, 2004). Future research should study the effect of the stretching programs with a large, randomized sample size. However, using a homogenous population (Latino) provides important data that can be compared with other ethnic groups.

In regard to practical applications, physical educators should incorporate stretching programs that help students develop and maintain both hamstring flexibility and core flexibility (Mayorga-Vega et al., 2017). Time for flexibility training could occur as part

of a structured warm-up, a fitness station that is part of a circuit, or during a cooldown at the end of a lesson. Ideally, stretching should be a part of daily PE classes as well as during extracurricular periods (Merino-Marban et al., 2015). Not only will this enhance the health of the students, but it should also increase the possibility of a score in the healthy zone for the sit-and-reach subtest of the FitnessGram.

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PEDAGOGY

Power Play: Leveraging Early Role Modeling in PETE to Influence Teacher Candidates

Derek J. Mohr, Brian Mosier, J. Scott Townsend

Abstract

This article details how two teacher education programs are leveraging role modeling to influence teacher candidates (TCs) by providing a prolonged, immersive, and high quality physical education (PE) activity experience early in each program and by systematically referring to and reflecting upon that experience in subsequent courses across the program. This early experience has been coined "Grade A Physical Education." Effective health and PE programs can help empower children to lead healthy and active lives. To help future health and PE teachers be effective, PE teacher education (PETE) programs, in part, need to consider the extensive work done on teacher socialization and teacher education curriculum design. Grade A PE has been informed by such research and systematically addresses critical professional preparation issues including but not limited to recruitment and retention, occupational socialization, and cultural relevance and inclusivity. This foundational activity-based experience provides vast opportunities for PETE programs to connect with and positively affect TCs' pedagogical values, knowledge, and skills. Therefore, this article presents two Grade A PE prototypes, each from a different university. It

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describes efforts made by each institution to leverage early role modeling to influence TCs' perceptions of and ability to teach PE for learning. Additionally, it offers key recommendations for the successful design and implementation of Grade A PE. Ideally, the reader will consider the need for and understand the components of Grade A PE, will examine the two prototypes presented, and will ultimately be inspired to design and implement similar experiences in their own teacher education programs.

A physical education teacher education (PETE) faculty member asks teacher candidates (TCs) during a lesson in an Introduction to Teaching Physical Education course, "Can you imagine a high school physical education class that is energized and festive, where students show up early, give 100% effort, are all highly active, demonstrate leadership and teamwork, genuinely cheer the efforts of their classmates, and learn?" It is a challenging question and sadly one that many TCs cannot imagine because they did not experience such a program during their time as pupils in physical education (PE). Perhaps an even more profound and pressing question is, how do we, PETE faculty, best help TCs design, implement, and sustain high quality PE programs when the concept is so completely foreign to most of them?

The influence of the K–12 acculturation period is exceptionally powerful as TCs form robust beliefs and biases about PE and PE teachers (Curtner-Smith et al., 2008; Lawson, 1983). Accordingly, PE TCs need and benefit from real-world experiences as pupils in quality K–12 PE programs. Some TCs' K–12 experiences likely align with best practices (i.e., SHAPE America, 2009), but the unfortunate reality is many do not, particularly at the secondary level. Inasmuch, TCs enter PETE programs as individuals with unique, well-established, and likely flawed ideologies regarding PE and PE teachers. Even as PETE faculty attempt to teach for and reinforce characteristics of quality PE, such processes and content are mediated by TCs who have vastly different, and often competing, experiences and perspectives (Betourne & Richards, 2015). Striving to reconcile these differences is not new, but given the type of experience TCs have as pupils in K–12 PE programs and the persistent nature of personal perspectives, coupled with the need to address recruitment and retention issues, experimenting with alternative and innovative

approaches in the PETE program is warranted (O'Neil & Richards, 2018; Richards et al., 2013). One such idea is to provide TCs with a shared, exemplary, and prolonged activity-based experience as pupils early in the PETE program so that they develop a mutual perspective of quality PE. Subsequently, this firsthand foundational quality PE experience can be systematically utilized by university faculty and teacher candidates as a point of reflection, discussion, and aspiration throughout the remainder of the undergraduate program.

We have coined this approach "Grade A Physical Education" and it has been employed by the teacher education programs at Appalachian State University (App State) and the University of West Georgia (UWG). In short, Grade A PE is a prolonged foundational activity-based PE experience taught by highly qualified, effective instructors applying best practices while using research-verified, teacher-tested curriculum and instruction models that promote physical literacy. Considering teacher candidates have observed their own K–12 teachers for upward of 13,000 hr (Lortie, 1975), coupled with the notion that most incoming PE majors have not had exemplary high school experiences, we believe providing an approach such as Grade A PE is a necessary component of the teacher education curriculum.

According to Curtner-Smith et al. (2008), PETE programs are considered one of the weakest forms of socialization. Although this may be for a variety of reasons, PETE faculty do have the ability to influence TCs' thoughts and perceptions related to PE (O'Neil & Richards, 2018). Accordingly, by way of Grade A PE, faculty can offer all TCs a shared, positive socializing agent early in the curriculum and a model to reference as they progress through the PETE program.

This article presents two Grade A PE prototypes, each from a different university. We outline the efforts made by each institution to leverage early role modeling to influence TCs' perceptions of and ability to teach PE for learning. We also offer key recommendations for the successful design and implementation of Grade A PE. Ideally, the reader will consider the need for and understand the components of Grade A PE, examine the two prototypes presented, and ultimately design and implement similar experiences in their own teacher education programs.

Appalachian State University

Program Overview

Students completing the program of study in Health and Physical Education (HPE) at App State earn a bachelor of science degree with a K–12 HPE professional educator's license. The HPE major curriculum consists of 45 semester hours of coursework and operates in a coordinated sequence, utilizing a cohort grouping system over four semesters. Each semester of coursework is referred to as a professional block (pro-block). This pro-block structure allows for a vertical model of integration where salient knowledge, skills, and dispositions are initially introduced and systematically developed across the curriculum through a variety of highly connected classroom, laboratory, and field-based teaching–learning experiences. Each successive teaching–learning experience across the curriculum requires the integration and application of increasingly sophisticated knowledge and pedagogy.

In addition, HPE majors select an 18–semester hour second academic concentration in either sport science and coaching or public health and complete 24 semester hours of professional education coursework, which includes a 12–semester hour student teaching internship as part of the degree requirements.

Grade A Physical Education Overview

At App State, Grade A PE takes place in the Introduction to Health, Physical Education, and Coaching (HPEC) course, which is situated in Pro-Block 1. The course meets 2 days/week for 75 min/day, is open to all students, has no pre- or co-requisites, and is organized into two distinct yet related segments, each lasting for one half of the semester. Segment 1 is classroom-based and like most introductory courses provides an overview of the HPEC professions, surveying issues integral to effective, professional practice in HPEC. Example topics include HPEC histories; national and state organizations and standards; learning theories, philosophies, ethics, and appropriate practices; trends, problems, and issues affecting the HPEC professions; diversity; and technology in HPEC. During this segment, specific teaching–learning activities in many of the topics listed purposefully prepare TCs for more fully understanding, valuing,

and assessing the pending Grade A PE experience. For example, TCs complete a personal biography assignment that requires a reflective analysis on their experiences in K–12 PE, including evaluations of the characteristics of their former PE teachers, and on their instructional practices and programs. Such information stimulates preliminary, albeit relevant and necessary, conversations regarding effective PE teachers and programs.

In Segment 2, Grade A PE begins in earnest. This segment engages TCs as pupils in a high quality "secondary-like" PE activity-based experience for a prolonged period (2 days/week for 7 weeks; 75 min/lesson). It utilizes the SPARK High School Physical Education program (Hart et al., 2011), a hybrid Sport Education (SE)/Tactical Games (TG)/Teaching Personal and Social Responsibility (TPSR) model, to best showcase the HPEC program's philosophy regarding quality secondary PE. A variety of nontraditional content such as orienteering, pickleball, cricket, speedball, and Kinball is selected, with each content typically being taught across two lessons (see Table 1). The instructor intentionally selects relatively novel content to pique interest and to provide for a more authentic, enriching teaching–learning experience for both the TCs and the instructor. However, they also select activities that are tactically similar to more common activities in which TCs are likely to have engaged previously. This "pairing" capitalizes on tactical transfer and accelerates learning of the novel content. For example, speedball is tactically similar to basketball, soccer, and football, and although speedball is relatively novel, the relationship among these invasion games gives TCs a better chance to learn the activity quickly.

Assessments of fitness, skill, and experience and dispositions are administered at the beginning and end of the 7-week experience. TCs use preassessment data to develop individual goals, and in alignment with the tenets of Sport Education, these data are also utilized in the creation of fair and equitable groups that persist for the entire experience. These groups engage in a team-building process, developing team names, mascots, slogans, and so forth; acknowledge and sign a fair-play agreement; and are assigned essential roles (e.g., coach, fitness trainer, official, scorekeeper, etc.) to complete over the "season." Also, a team points system is employed whereby teams earn daily points for (1) preparation and engagement, (2) fair

Table 1
Appalachian State University Grade A PE Sample Daily Overview

Day	Content/topic & lesson type
1	Preassessment: *Personal Best* (FitnessGram & Skills)
2	Orienteering: On-a-Line Orienteering *Game Day*
3	Orienteering: Map Challenge *Game Day*
4	Disc Games: KanJam *Game Day*
5	Disc Games: Disc Golf *Game Day*
6	Speedball: *Adventure Race*
7	Speedball: *Game Day*
8	Kin-Ball: *Skill Builder*
9	Kin-Ball: *Event*
10	Cricket: *Fun-Day-Mentals Jigsaw*
11	Cricket: *Event*
12	SportFIT: *Create Your Own Routine* & *Game Day*
13	Postassessment: *Personal Best* (FitnessGram & Skills)
14	Culminating Event: Awards Banquet/Celebration Day

play, and (3) performance in the daily game or activity. Students earn bonus points by demonstrating exemplary in-class behaviors; by creating team posters, playlists, and jerseys; and by engaging with teammates in physical activity outside of class. Teams accrue points across lessons and ultimately one team is recognized as season champion during the culminating event.

The Grade A PE experience is administered via Moodle, an online course management system. The program uses technology in a variety of ways before, during, and after each class to showcase its effective implementation in PE. For example, the program employs a flipped-classroom approach whereby TCs watch a video, complete an assigned reading, and take a brief knowledge quiz online outside of class prior to the teaching of new content. Accordingly, this approach prepares TCs in advance and makes for a more efficient and effective face-to-face experience. The typical face-to-face lesson in this SE/TG/TPSR hybrid approach includes three major segments: (1) Instant Activity, (2) Main Activity, and (3) Closure. Technology such as Plickers, QR codes, mobile devices and apps,

and Bluetooth speakers are also employed. A spectrum of teaching methods ranging from direct instruction, to peer teaching and cooperative learning, to problem solving are used. Most frequently, a game-question-practice-game format is used during the main activity segment of the lesson. This format showcases the major elements of the TG model while helping the TCs to develop tactical awareness and improved game performance. In addition, the TPSR model is highlighted through a process of defining and discussing a daily character trait during the beginning of the lesson; challenging TCs to attend to and demonstrate that trait during the activity time; and then, during the closure, allowing TCs to reflect upon and assess the degree to which they successfully demonstrated the focus-trait of the day.

The primary purpose of Grade A PE is to simulate quality PE and allow TCs to fully operate as pupils, but the opportunity for TCs to concurrently draw meaningful pedagogical connections regarding the experience cannot be squandered or left to chance. Accordingly, TCs complete postclass reflections focused on specific instructional practices (SHAPE America, 2009) after each lesson. The reflections prompt TCs to compare and contrast appropriate and inappropriate practices related to their personal experiences in both secondary PE and Grade A PE. The reflections also shape their perceptions to be more consistent with those espoused by the profession at large. For example, after Lesson 1, Preassessment: Personal Best (FitnessGram & Skills), TCs complete a reflection focused on practices associated with fitness testing (i.e., 4.3.1 of SHAPE America's Appropriate Instructional Practice Guidelines for High School Physical Education). By design, the reflections have great potential to change perceptions and instructional practice given that they take place immediately after class, challenge prior experiences and perceptions, and are based on recent personal experience that was engineered to be appropriate.

As TCs progress forward through the PETE program, the value of Grade A PE is fully realized when in subsequent courses instructors and TCs are challenged to draw upon the foundational experience to further reflect, dissect, and project. For example, when instructors engage TCs in pointed discussions and ask if TCs have ever experienced "this" or "that" appropriate practice, TCs can indeed now

say "yes." Instructors are also free to draw the curtain back on the theoretical and applied pedagogical aspects of Grade A PE, making meaningful connections that are often elusive when TCs do not have firsthand experience with high quality PE.

As educators, we understand and value the powerful effect of beginning with the end in mind. Grade A PE, when taught early in the teacher education program, not only fulfills that important purpose but also provides a much needed aspirational function whereby TCs can envision a future in which high quality PE is personal reality. The following discussion lists a few of the many ways that App State intentionally uses Grade A PE in subsequent courses as a part of a larger educational process in the PETE program. Many of the activities and assignments highlighted herein may appear typical or even familiar, but the Grade A PE lens enhances their transformational potential.

In Pro-Block 2, TCs take a general pedagogy course focused on learning and applying Rink's (2014) teaching functions. Multiple activities are used to address each of the teaching functions, but particular assignments rely on the TCs' previous experience in Grade A PE. For example, elements of task presentation and of management and organization from Grade A PE lessons are evaluated for effectiveness and congruence with those advocated by Rink. Simultaneously, TCs are enrolled in another course focused on assessment in health and PE. An assignment in this course challenges students to analyze the Grade A PE grading system for alignment with (1) national and state standards and (2) guidelines for effectively measuring and evaluating student learning outcomes in each domain. Consequently, drawing on a quality personal experience makes for authentic and impactful reflections, each of which are aimed at influencing perceptions and future instructional actions.

In Pro-Block 3, TCs enroll in a course focused on teaching health-related fitness. In this course, TCs review the fitness education process (Corbin et al., 2016; i.e., diagnosing, goal setting, creating and implementing an activity plan, and monitoring and reassessment) and compare that to the one implemented in Grade A PE. In addition, TCs are enrolled in a course focused on model-based instruction in PE. In this course, TCs study the theoretical and applied aspects of research-validated, teacher-tested instructional models such as SE,

TG, and TPSR, which make up the hybrid model used in Grade A PE. The process of examining the theory, research, and application of each model, coupled with the previous Grade A experience, provides fertile ground for exploring, demystifying, and making model-based instruction in PE more likely for these TCs. A third course, which can be thought of as the "laboratory" for the models-based course, focuses on the teaching of sport and activity. This course provides one of the most unique and worthwhile experiences in the PETE program; that is, TCs in this course attend, participate in, manage, and teach Grade A PE. The teaching is carried out under the direct supervision of both the Grade A PE instructor and the Pro-Block 3 course instructor. Though logistically challenging, this arrangement, which has evolved over time, provides Pro-Block 3 TCs with an authentic, secondary-like teaching experience. This is particularly meaningful given the limited number of secondary placements in the immediate vicinity and the need to preserve those placements for student teaching balanced against the need to have TCs teach as much as possible. TCs assist in the administration of the Grade A experience via the online course management system, gaining valuable instructional technology skills in the process. In addition, the professional relationships developed between the Pro-Block 1 students and the Pro-Block 3 peer teachers are significant and valued, enduring even after the experience. This experience also serves as a stepping stone to prepare the Pro-Block 3 TCs for a similar yet more involved field-based experience in Pro-Block 4.

TCs in Pro-Block 4 complete a 7-week field-based experience teaching a course in the university's basic PE activity program. TC pairs are assigned to one of a variety of courses such as basketball, badminton, soccer, ultimate, volleyball, and weight training. TCs are under the cosupervision of the activity course and PETE instructors and implement modified versions of the corresponding SPARK High School Physical Education units. TCs rely upon the Grade A PE experience, both as pupils during Pro-Block 1 and as managers and peer teachers during Pro-Block 3, to support and shape their planning, instruction, and assessment during this Pro-Block 4 teaching assignment.

Finally, during student teaching, TCs are challenged to apply what they have learned during the PETE program. Accordingly, Grade A PE becomes a frame of reference for what is possible, and

even expected, given that it is a part of each TC's recent reality. Ideally, the cumulative effect of engaging in and systematically reflecting upon Grade A PE is high quality PE for all students who will be served by these TCs during student teaching and beyond.

University of West Georgia

Program Overview

Preservice teacher candidates completing the program of study in Health and Physical Education at UWG earn a bachelor of science degree and are eligible for a K–12 HPE professional educator's license. TCs in the UWG PETE program engage in 64 credit hours of professional content courses, in addition to 60 credit hours before beginning the teacher education program, totaling 124 credit hours. The PETE program at UWG is grounded upon the National Standards for Initial Physical Education Teacher Education (SHAPE America, 2017). All courses within the program have been developed from or align with these six national standards. Certain courses, however, are considered the backbone and foundation of the program, whereas the other required courses complement the foundational courses. These "foundational courses" include Instructional Strategies in Physical Education (a 3–credit hour plus lab methods course offered in Block 1), Physical Education in Elementary Schools (a 4–credit hour plus lab methods course offered in Block 2), Physical Education in Middle/Secondary Schools (a 4–credit hour plus lab methods course offered in Block 3), and the student teaching internship (9 credit hours of internship plus 3-credit seminar course offered in Block 4). The courses that complement the foundational courses include a series of "skills and strategies" courses, in which the objective is to increase the TCs' knowledge and skills in a variety of sport- and fitness-related content (e.g., educational games, gymnastics, dance, invasion games, net/wall games, outdoor activities, and strength and conditioning). Other complementary courses include Human Movement Studies, Contemporary Health Issues, Advanced Concepts of Personal Training, Adapted Physical Education (field-based), Assessment in HPE, Health Education (field-based), and Current Issues in HPE (Heidorn & Mosier, 2017).

Beyond initial certification for teacher licensure in Georgia, all teacher candidates at UWG are required to earn First Aid/CPR

certification. In addition, all teacher candidates have the opportunity to pursue (1) national certification as a personal trainer, (2) national coaching certification, and (3) a state-level physical activity leader certificate. This UWG-based physical activity leader certificate is the result of a partnership supported by the Georgia Department of Education and Georgia Department of Public Health.

Grade A Physical Education Overview

At UWG, the Introduction to Health and Physical Education course is open to all students throughout the university as one strategy for recruiting a diverse population of students. Diversity not only includes race and gender but also engaging students who have broad experiences and interests in all forms of physical activity (Woods et al., 2016). For example, some students have experiences in nontraditional physical activities such as step clubs, gymnastics, or hiking. Broadening the pool of potential PE teachers to include students who value (and want to teach) other content besides the traditional team sports could lead to more TCs teaching nontraditional content in K–12 schools upon graduation. In turn, this also has the potential to reframe the traditional high school PE model (Richards et al., 2014). Purposeful recruitment of all students at UWG requires the concerted effort of the academic department and advisors, attractive and engaging flyers, individual messaging to students through email, word-of-mouth from current TCs, social media campaigns, recruiting events, student clubs, and learning communities.

The Introduction to Health and Physical Education course at UWG is a 15-week course. Students meet 2 days/week, 70 min/lesson (see Table 2 for weekly overview). This course, much like the course at App State, is taught in two distinct segments. The first segment, Weeks 1 to 9, is similar to most traditional introductory courses. The second segment, Weeks 10 to 15, introduces the common, exemplary experience coined "Grade A PE."

During the first week of the course, TCs submit an autobiographical essay based upon their experiences as students of K–12 PE at every level (elementary, middle, and high school). TCs then participate in an instructor-led, in-class discussion that questions and challenges their belief structures of PE. These group discussions are nonthreatening and are not evaluated. They provide a safe space for TCs to consider what knowledge and skills their former teachers

Table 2
University of West Georgia Grade A PE Sample Weekly Overview

Week	Content/topic & lesson type
1	Walking Through Past Experiences in HPE
2	Preassessment: *Personal Best* (FitnessGram & Skills)
3	Appropriate Practices of Health and Physical Education
4	Historical Perspectives of Health and Physical Education
5	Professional Dispositions for Teachers and Coaches
6	Adapted Physical Education
7	Advocacy in Health and Physical Education
8	Comprehensive School Physical Activity Programs
9	Personal Experiences & Philosophical Approaches
10	Disc Skills and Drills
11	Disc Strategies and Small-Sided Games
12	Disc Strategies and Small-Sided Games
13	Disc Tournaments
14	Disc Tournaments and Celebration
15	Postassessment: *Personal Best* (FitnessGram & Skills)

possessed and/or demonstrated and for TCs to consider their own perspectives of effective or ineffective teaching or coaching strategies.

In Week 2 of the semester, TCs are introduced to the fitness education process (Corbin et al., 2016). Fitness education is an important component of the program's curriculum and is integrated throughout this course. After learning and practicing FitnessGram protocols, TCs are evaluated in the five areas of health-related fitness (HRF): aerobic capacity, muscular strength, muscular endurance, flexibility, and body composition. TCs record their baseline fitness levels in each area of HRF, as well as blood pressure and body fat analysis. TCs then set goals to improve and/or maintain appropriate levels of fitness according to the FitnessGram (HFZ). The instructor allows students a variety of methods to monitor fitness goals (e.g., activity logs, apps, etc.). TCs are required to reevaluate any FitnessGram assessments throughout the semester and realign goals with their instructor as needed. Skipping ahead to the last week of the semester,

students complete a post-FitnessGram assessment and compare their results to the individual fitness goals set at the beginning of the semester. Each subsequent semester in the undergraduate program, TCs are reassessed on their fitness level and reevaluate their levels of HRF. TCs are expected to reach the HFZ in each area of HRF and continue setting goals to maintain or improve their levels of fitness to meet Standard 2.b (i.e., "Achieve and maintain a health-enhancing level of fitness throughout the program") of the National Standards for Initial Physical Education Teacher Education (SHAPE America, 2017). If TCs do not meet the recommended HFZ levels, the PETE faculty continue to hold TCs accountable for setting and meeting short-term goals related to their own fitness levels. At no point are the TCs' fitness levels used for grades or compared with other TCs' fitness levels. The TCs also spend considerable time participating in and reflecting on their short- and long-term goals. In turn, the instructor capitalizes on the common experience and uses this to frame appropriate practice as it relates to fitness, fitness testing, and fitness education. This same process should be happening in personal fitness classes at the high school level across the nation. Additionally, but unrelated, PETE faculty also regularly evaluate and assess their own fitness levels with the TCs. The PETE faculty believe role modeling this process brings another level of engagement and can motivate the TCs.

In Weeks 3 to 9, TCs are introduced to content related to appropriate practices of HPE, historical perspectives, professional dispositions, adapted PE, current advocacy efforts, comprehensive school physical activity programs, and philosophical approaches in HPE. TCs read assigned professional journal articles related to these topics and engage in class discussions and debates. TCs also observe quality PE classes (at least two sites) in local schools for a total of 8 hr. Along with the observations, TCs interview at least one current PE teacher. The PETE faculty provide guidance in coordinating the observations and interviews. This allows for TCs to visit sites that the faculty would consider Grade A programs. Using all of the information gained from the assignments, observations, and interviews, each TC submits an initial draft of their personal teaching philosophy. The TCs then revisit and revise their personal teaching

philosophy while continuing to learn concepts related to standards-based, quality PE throughout the course and subsequent semesters.

The last segment of the introductory course (Weeks 10 to 15) focuses on participation in a Grade A PE experience. The instructor plans and delivers a 5-week unit (2 days/week for 5 weeks; 70 min/lesson). The instructor has discovered that disc games (ultimate Frisbee) is a unit that the TCs have not had much experience with but are able to transfer their skills from more common invasion games to. Further, disc games facilitate moderate-to-vigorous physical activity, do not require much equipment, and do not need a referee. The instructor highlights why the unit was chosen and how it promotes lifetime physical activity. On a typical day, TCs enter the class and begin in physical activity related to the content. All instructor-led lessons incorporate components of the eight teaching functions defined by Rink (2014). These include identifying outcomes, planning, presenting tasks, organizing and managing the learning environment, monitoring the learning environment, developing the content, assessing student performance, and evaluating the instructional process. Lesson outcomes are established for all three domains of learning and are periodically evaluated and assessed as part of the TCs' grade for the course. The psychomotor domain is assessed using the PE Metrics rubric for ultimate Frisbee (National Association for Sport and Physical Education, 2011). The TCs should meet the minimum level of skill performance (Level 3) according to the criterion-based rubric by the end of the unit. Many TCs practice outside of class time to perform well on the rubric. The cognitive domain of learning is measured by online quizzes related to rules and etiquette of the game, critical cues and features of the skills, and strategy related to invasion games. By completing the quizzes online, TCs gain an understanding of the game without having to lose critical practice time during class. The online quizzes are included in the TCs' final grade as well. The affective domain is measured by a program approved dispositions assessment. The areas evaluated on the dispositional instrument are attendance, class preparation, appearance, communication, ethics, responsiveness, participation, and professional development. TCs have the opportunity to review the rubric prior to the unit, making sure they have a clear understanding of the expectations of the program. Although evaluated, students

are not graded on their dispositions assessment. Students receive feedback related to their dispositions and are reevaluated each subsequent semester.

Extending the Grade A Physical Education Experience

After completing the Introduction to Health and Physical Education course, TCs engage in 64 credit hours of professional content courses. Although not all of the complementary courses directly connect to the Grade A PE experience, many courses integrate the concepts of quality PE, building upon the TCs' previous knowledge and experiences. Instructors can continually refer back to common, shared experiences to draw upon effective and appropriate strategies for teaching and learning.

The semester immediately following the Introduction to Health and Physical Education course, TCs are enrolled in Instructional Strategies (Block 1). Instructional Strategies is a lab-based course that meets twice a week, 140 min/session. This course provides TCs with the basic pedagogical skills and knowledge related to teaching HPE in K–12 settings. TCs develop and build teaching skills through observations and by practicing effective teaching behaviors through peer teaching experiences. Each TC completes five peer-teaching experiences throughout the semester. The first experience begins with a 10-min "micro-lesson" focusing on an effective set induction and clear task presentation. The subsequent lessons build upon the first by adding additional elements such as quality demonstrations, teacher movement, instructional feedback, alignment to objectives, and a closure, all leading up to a 30-min lesson. TCs record each lesson and submit time-stamped, guided reflections that align with the tenets of Grade A PE. The instructor observes and grades two peer teachers at one time and also grades the TCs' lesson plans and reflections.

After Instructional Strategies, TCs enroll in Physical Education in Elementary Schools (Block 2) and then Physical Education in Middle and Secondary Schools (Block 3). During these courses, TCs teach 14 lessons to K–12 students in each course. The TCs receive guidance and feedback from the university instructor and the K–12 teacher (site supervisor or cooperating teacher) with respect to the planning and implementation of lessons. TCs are evaluated on the effectiveness of their planning, teaching, and reflective practices by

both the university instructor and the K–12 teacher through formative and summative assessments. The practicum-based courses culminate with a traditional 15-week student teaching internship (Block 4).

Historically, the PETE faculty determine specific schools and teachers for the practicum sequence and the student teaching internships. This process enables the faculty to be selective in terms of the environment(s) in which TCs observe and teach. Securing quality, Grade A programs is necessary in the development of an effective and sustainable practicum sequence. To maintain and secure additional quality K–12 programs as partners, the PETE faculty have created a Physical Education Advisory Council. Members of the council are teachers (approximately eight) who have been appointed because of their efforts in teaching standards-based, quality PE. The teachers model effective pedagogical practices, assist in the practicum sequence, stay active in professional associations, and/or attend professional conferences. They volunteer their time and efforts with the mission to maintain and improve quality PE in local schools. The council collaborates with the PETE faculty on a variety of topics. Specific monetary compensation is not provided to council members. For the scope of this paper, one particular task is assisting the PETE faculty in evaluating programs for internship experiences. When the program receives a new inquiry for hosting a student teacher, the program coordinator requests a completed application packet from the potential cooperating teacher. The packet includes a résumé, a teaching philosophy, a yearlong curriculum, and a sample lesson plan. The program coordinator sends the materials to the council for review. After completing the review, the council provides a recommendation to the PETE program. If the council approves the application, the PETE program begins developing a professional relationship with the new prospective cooperating teachers. The faculty have learned that K–12 teachers who do not have a set curriculum do not attempt to follow through with the application process. This, in turn, has provided the program a mechanism to collaborate with school partners that share the same philosophical approach in terms of quality PE programming. Additionally, council members feel honored to be a part of the process. They do this work voluntarily, without any stipend. The program provides to the

administrator of each council member a letter of support identifying their effort and professional contribution to the field.

The TCs also take a variety of skills and strategies courses designed to improve their level of knowledge, competence, and confidence in a variety of activities. These courses include net/wall games, target/outdoor games, invasion games, strength and conditioning, education games, gymnastics, and dance. These courses are lab-based and meet for 100 min, twice a week for 15 weeks. TCs ultimately receive over 15,000 min of skill-based instruction and practice before graduation. In the skills and strategies courses, TCs are evaluated on Standard 1 (Content and Foundational Knowledge) and Standard 2 (Skillfulness and Health-Related Fitness) of the National Standards for Initial Physical Education Teacher Education (SHAPE America, 2017). The skills and strategies courses reinforce the Grade A PE philosophical approach shared earlier in the program. The design of the skills and strategies sequence allows TCs to be pupils of PE and physical activity. The instructor in each course is the expert and plans and delivers quality PE lessons. The PETE faculty find that TCs repurpose many of the lessons from the skills and strategies sequence as they plan and teach lessons to K–12 students in the practicum sequence and internship.

In their third semester, TCs are enrolled in an Assessment in Health and Physical Education course. One outcome of this course is comparing, contrasting, and analyzing different grading systems related to PE. While TCs take this course, they are simultaneously enrolled in the Physical Education in Middle and Secondary Schools course and begin to implement evaluation and assessment measures in their teaching. At this point in the undergraduate curriculum, TCs have been evaluated and assessed on each domain of learning (as a student) and often see the value in conducting similar assessments among K–12 students in their practicum experience.

In the last semester, TCs complete a student teaching experience. TCs participate in the full context of a K–12 school day for 15 weeks at one school. In addition to planning, teaching, and reflection in a PE environment, TCs complete the edTPA submission portfolio process (state requirement). TCs also plan and implement an action-based research comprehensive school physical activity program project. Additionally, all TCs take a 3–credit hour teaching internship seminar in which, among other content, they compare

and contrast their daily experiences with standards-based, quality PE programs. Throughout the PETE program, TCs are encouraged to reflect upon their foundational Grade A experiences. These experiences begin in the introductory course and build upon each other in subsequent semesters. Ideally, the TCs hold value in their shared, elongated experiences throughout the PETE program. In turn, when TCs start their careers as new teachers, they will have the skills, knowledge, and dispositions to administer and advocate for quality PE to K–12 students.

Recommendations for Implementing Grade A Physical Education

The challenge associated with envisioning, designing, implementing, assessing, revising, and sustaining a Grade A PE experience cannot be underestimated. However, in our judgment, the benefits far outweigh the challenges. The recommendations offered, although not exhaustive or perfect, come from many years of trial and error, represent the most critical elements of the process, and are intended to serve as a catalyst for making Grade A PE a reality in any program.

Pause: Start With Why

Before embarking on the Grade A PE process, those involved must ask and answer this critical question: Why do this? Fully answering this question will provide a clear purpose, giving direction, focus, and energy to planning, implementing, and sustaining Grade A PE.

Timing: Early and Prolonged

Grade A PE should be offered as early as possible in the program so that faculty can leverage its potential in as many subsequent courses as possible. In addition, consideration should be given to how much time will be devoted to the experience so that relationships and memories that will endure across the program are built. While one or two days is insufficient, an entire semester may not be possible either. We recommend a duration of at least 5 weeks (10 lessons).

Content: Go Novel

In an effort to make Grade A PE as meaningful as possible for both the TCs and the instructor, we recommend selecting novel

content; that is, content in which TCs likely have limited experience. Selecting such content not only serves to make teaching and learning more authentic but also piques interest and provides TCs with a perspective on being a beginner. Having firsthand experience as a beginner builds up pedagogical empathy in TCs, allowing them to more successfully relate with beginning learners in their future classes. Additionally, decisions need to be made regarding the variety of content. For example, will the instructor teach one or multiple activities or sports? While there is not necessarily a right of wrong answer here, it is important to consider facilities, equipment, time, number of students, and instructor expertise as you determine what to teach.

Instruction: Model the Master

A major challenge is determining who will teach Grade A PE. We have experimented with many instructional arrangements including nontenure track activity program instructors, PETE faculty, and TCs with varying levels of experience. Regardless who is called into action to teach, the bottom line is that Grade A instructors should be good at teaching PE, particularly since a significant intent of Grade A PE is for instructors to role model quality instruction in PE for TCs.

Format: Master the Model

The method of teaching Grade A PE is equally important as who teaches it. Given the need to train TCs in model-based instruction, it is advantageous for instructors to use research-verified, teacher-tested PE models during Grade A PE to launch such training. We advocate and have had great success using SE, TG, and TPSR instructional models. Grade A PE, in this way, represents a first step in helping TCs to master model-based instruction.

Extend: Integrate to Accelerate

With TCs general lack of experience in quality K–12 PE as pupils, PETE faculty face significant challenges in making meaningful connections that yield changes in TCs' preconceived notions regarding PE and PE teachers. However, this issue can, in part, be mitigated when faculty intentionally rely on and refer to the Grade A PE experience in subsequent coursework. To maximize the potential of Grade A PE in subsequent courses, however, all PETE faculty need to be made aware of the Grade A PE experience and rationale

and should support its inclusion in the curriculum. Furthermore, it is helpful if faculty share ideas with one another and have a coordinated approach for integrating teaching–learning assignments that draw upon the Grade A PE experience. In doing so, faculty integrate Grade A-based activities to accelerate learning in their own courses.

Market: Recruit & Retain to Train

Enlisting, keeping, and positively affecting TCs in PETE programs is a longstanding issue that has received much needed attention (SHAPE America & National Association for Kinesiology in Higher Education, 2018; Ayers & Richards, 2019). Calls for nontraditional approaches to address this issue have been made (O'Neil & Richards, 2018). Grade A PE appears to align well with such current thinking, offering a multifaceted mechanism that can serve as a recruitment, retention, and training tool.

Regarding recruitment, intentional and comprehensive marketing campaigns are critical to bolstering enrollment and to enlisting a diverse clientele. Accordingly, getting the word out to all students about Grade A PE is critical. Posting flyers, using social media and on an eBoard, and sharing information via direct email and face-to-face meetings with students, faculty, general and program-specific advisors, and administrators can effectively broadcast information about Grade A PE. Messaging about Grade A PE, with a particular focus on the novel content and testimonials regarding how enjoyable and influential the experience is, piques student interest and aids in the recruitment efforts. Doing Grade A PE well is part of the marketing strategy too. As Grade A PE is implemented successfully over time and becomes an increasingly institutionalized part of the program, word-of-mouth represents a critical part of the marketing process. Additionally, structuring the course as part of the general education curriculum entices students who may not otherwise consider taking the course, to enroll and perhaps later join the major. Grade A PE also aids in the retention of TCs. For example, Grade A PE is intended to be enjoyable, to help TCs develop meaningful relationships with their peers early in the program, and to provide an aspirational vision of quality PE. Collectively, these elements may influence TCs to remain in the program. At a time when enrollment in PETE is a serious issue, it is worth it for PETE programs to consider

Grade A PE as part of a comprehensive strategy to recruit and retain TCs.

Conclusion

Grade A PE is an immersive experience that a cohort of PE TCs complete together. This shared, exemplary experience begins early, is leveraged throughout the program, and is fully applied in the student teaching internship. Grade A PE gives TCs an opportunity to systematically decouple their subjective warrants regarding their past K–12 PE experiences, provides an exceptional common experience that TCs revisit throughout the program, and supports instructional effectiveness in their future K–12 programs. We have integrated and have continued to refine the Grade A PE experience in our respective programs over the past several years, believing this is a worthwhile endeavor. We hope you share that perspective and accept the challenge of integrating such an experience in your own program.

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PEDAGOGY

Exploring the Use of Triad Student Teaching Placements in Physical Education

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Abstract

This study explored the use of triads (a mentor teacher and two student teachers) in physical education. Wenger's (1998) communities of practice provided the theoretical framework for this study. We used the constant comparative method to code the interviews (n = 33) and field notes of the 11 triads and their university supervisors. Two global themes, benefits and drawbacks, emerged from the data. Benefits consisted of three subthemes: quality feedback, support, and collaboration. Drawbacks consisted of four subthemes: unrealistic experience, laziness in preparation, lack of quality feedback, and personality mismatch. Recommendations include providing in-service training about how to optimize the triad experience, ongoing seminars specifically designed for triads, and a hybrid model of triad placement and traditional solo student teaching.

Within the traditions of Bandura's (1977) social learning theory, Wenger (1998) observed that either formally or informally, teachers work and *learn* (increase in knowledge, expertise in application, and ability to navigate in the educational culture) within communities of practice (CoP). CoPs are "groups of people who share a concern,

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a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger et al., 2002, p. 4). Wenger's view of social learning theory proposes that *learning* takes place through social participation characterized by active engagement in the professional communities (including preservice student teachers) surrounding their work as educators.

Traditional models of student teaching practices typically involve the placement of a single novice with an experienced mentor teacher. However, because of the ever-decreasing number of quality placements, teacher educators have begun to explore alternative models. For example, several researchers (see Bullough et al., 2002, 2003; Goodnough et al., 2009; Nokes et al., 2008) have examined the placing of two student teachers with one classroom mentor teacher. Wilkinson et al. (2014) subsequently explored triad relationships and member satisfaction with the paired placement student teacher model in physical education teacher education (PETE).

A CoP perspective may provide a useful theoretical lens for the examination of the paired student teaching model operating in a triad (Goodnough et al., 2009; Wilkinson et al., 2014) CoP.

Characteristics of Communities of Practice

Wenger (1998) suggested that for learning to occur, CoPs operate on three key elements: (a) mutual engagement, (b) joint enterprise, and (c) shared repertoire. Interactions among these key elements ideally result in *learning* from which members develop *meaning* (once abstract ideas become more concrete, providing value, understanding, clarity) and *identities* (development of self-images and adoption of roles within the context of the CoP). However, the quality of learning and the appropriate adoption of identities, largely depends on (a) participant choice to contribute actively to the overall enterprise of the CoP by making creative use of their respective repertoire (Wenger, 1998).

Mutual Engagement

Mutual engagement is the meaning people negotiate with one another through shared experiences. It is sustained relations of engagement organized around the purpose of what they are there to do (Wenger, 1998). To participate in mutual engagement, it is critical

that teachers are viewed by other members of the CoP as active participants; otherwise, they can formally or informally be left out of the CoP.

Joint Enterprise

Joint enterprise is the process in which people are engaged *and* working toward a common goal. Although there may be much in common among the members of the CoP, it takes specific and consistent coordination of sustained effort for there to be a joint enterprise. Wenger (1998) made an important point that sustained interpersonal engagement can create its fair share of conflict and tension, challenge, and disagreement within a CoP. A joint enterprise is the result of negotiated mutual engagement reflected in shared repertoires, mutual accountability among its members, and complex conditions that shape the CoP. Joint enterprise may be viewed as a CoP response to an outside mandate (e.g., being placed in a paired student teaching placement triad) as the result of an ongoing process not necessarily defined by a specific event.

Shared Repertoire

A shared repertoire is the way in which a learning community does things (e.g., tools, routines, common professional language, and shared resources) that are a reflection of past mutual engagement. It is an ongoing, dynamic, and fluid outcome of negotiated meaning in which shared beliefs are not set in stone.

Collaborative Action-Based Research

Strategies intended to facilitate a successful experience in student teacher triads included three collaborative, action-research based ideas: (a) peer coaching, (b) coteaching, and (c) cogenerative dialoguing with the intent to facilitate the interaction of these three key elements that may produce learning and meaning.

Peer Coaching. Wynn and Kromrey (1999) described this teacher training method as pairs of teachers observing each other and providing feedback to help one another apply effective teaching strategies and proposing alternative solutions to identified instructional needs. The use of peer coaching has been found to be effective in both in-service teachers' and preservice teachers' growth in planning and organization, instruction, and classroom management

(Hasbrouck, 1997; Morgan et al., 1994; Pierce & Miller, 1994; Wynn & Kromrey, 2000).

Coteaching. Tobin and Roth (2005) proposed that preservice teachers are aided in becoming professionals through the support and involvement of cooperating teachers, supervisors, preservice teachers, and researchers via coteaching. More salient to this study, Goodnough et al. (2009) suggested the value in student teachers working collaboratively in pairs (planning, lesson implementation, reflection, debriefing; i.e., learning from one another through practice) but teaching individually (Roth, 2001).

Cogenerative Dialogue. Cogenerative dialoguing (i.e., all colearners meet to discuss specifics of lessons, general pedagogical approaches, or any other aspect of the teaching and learning process; Roth & Tobin, 2002; Tobin & Roth, 2005) is a strategy to examine the strengths and areas for improvement. This collaborative process within a group of professional educators allows for different perspectives to enhance the learning of all involved, not just the learning of the student teachers.

In PETE, Jenkins and Veal (2002) studied the development of pedagogical content knowledge (PCK) with preservice teachers during peer coaching. Findings indicated that preservice teachers' growth in the teaching role resulted initially from interaction of two knowledge components (i.e., students and pedagogy) and later from three or more components (subject matter, environmental context, and general pedagogical knowledge).

Student Teaching in Triad Placements

In the student teaching experience, a CoP may develop when the triad placement model is utilized. Bullough et al. (2003) published one of the initial studies examining the use of the triad placement student teaching model as an alternative to the traditional model of one student teacher working with a cooperating teacher. Findings indicated that the use of triads provided the advantages of increased support, opportunity for ongoing conversation about teaching, and learning how to collaborate to improve practice (Bullough et al., 2003).

Similarly, Nokes et al. (2008) studied the perceived strengths and weaknesses of the triad model with secondary teacher education students. Findings indicated that student teachers participating in the

triads enjoyed a rich learning experience due to the dialogue, tensions, and reflections of being placed with a peer.

Goodnough et al. (2009) examined the benefits and challenges for student teachers and cooperating teachers who participate in a triad model. They also described the coteaching models that emerged during the experience. Findings indicated several strengths of the triad model as learning from each other, professional support, outcomes for K–12 students, comprehensive feedback about teaching and classroom practice, and preservice teacher confidence. Martin (1977), however, pointed out that mentoring is idiosyncratic and often unpredictable. Therefore, the present mentor teachers, although required to participate in the triad interactions, were encouraged to develop their own way of working with the student teachers to create a beneficial experience. Concerns and challenges included dependency, confusion with classroom management issues, loss of individuality, and competition between the preservice teachers (Martin, 1977).

The use of triad student teaching placements appears to have the potential to overlap nicely with Wenger's (1998) theory of CoP and its key elements, along with collaborative action-based strategies. There is limited published research on triad placements operating as CoPs within physical education. Therefore, this study explored the perceptions of student teachers in a triad placement in physical education and the extent to which the elements of a CoP are evident.

Method

Setting and Participants

This study was conducted at a private university in the Western United States with institutional review board approval. In the last semester of the PETE program at the university, student teachers were placed in a triad for a 14-week student teaching experience. Twenty-two PETE students were assigned as pairs in six high schools, five junior high schools, and one elementary school, in three school districts. The one exception was a pair that worked for 7 weeks at an elementary school and then for 7 weeks at a junior high school, thus having two mentor teachers and participating in two triads. Students were assigned into triads based on perceived common attributes, personalities, and values, as well as on the context of the schools in

which and teachers with whom they were placed. There were seven all-female triads and four all-male triads. Five university supervisors were assigned to oversee the student teaching triads based on personalities and experience. Because this is a cohort PETE program, the student teachers all knew one another and had previously taught in pairs.

Twelve mentor teachers participated in the study. All of the mentor teachers had a minimum of 3 years of experience as physical educators. All of the mentor teachers except two had served in the role of mentor in the past for this PETE program. All students and mentor teachers read and signed letters of informed consent to participate in this study.

Procedures

In a half-day orientation meeting held the day before the beginning of the semester, student teachers received the following instructions to be followed during the student teaching experience: (a) coplanning (b) individual teaching (alternately teaching a lesson while the partner observed), and (c) peer coaching. Of primacy to this study was whether individual teaching, coplanning, and peer coaching would exhibit the characteristics of a CoP for triad members.

Student teachers were required to plan lessons with their partner (Nokes et al., 2008), teach a lesson individually, followed by an evaluation session and peer-coaching (Goodnough et al., 2009; Roth & Tobin, 2005). The full triad was required to meet daily for cogenerative dialoguing (Roth & Tobin, 2005).

University supervisors observed their students teach at least every 2 weeks. While one student taught, the supervisor observed the lesson alongside the other student while engaging in evaluative dialogue. The same procedure was followed in the next lesson, when the students reversed roles. After both lessons, the supervisor met individually with each student and then with the triad to discuss their observations, including ways students could help each other in planning and evaluating each other's teaching, as well as giving suggestions for working effectively with each triad member. Supervisors took field notes of their observations during these experiences.

Twice monthly, student teachers met at the university for a 2-hr seminar conducted by a PETE faculty member serving as the student

teaching coordinator. In these sessions, they received information to help them with the student teaching experience and to help prepare them for teaching employment after graduation. The first 15 min of these seminars consisted of reflections and debriefing in which student teachers discussed their teaching successes and challenges. The remainder of the session focused on the following topics: (a) modifying unit plans they had created in teaching methods courses to make them more appropriate for their current K–12 students, (b) gathering assessment data for the unit plan, (c) creating a résumé, (d) uploading and evaluating film footage of their teaching to help improve teaching skills and then using digital video editing software to database desired competencies to fulfill a university assignment, (e) preparing an employment portfolio, (f) developing and practicing interviewing skills with a peer and receiving feedback from the student teaching coordinator, (g) participating in mock interviews with an administrator and physical education teacher from one of the local school districts, and (h) a self-assessment of their fitness levels.

Data Collection

Semistructured Interviews at the End of Student Teaching

Four researchers not involved with the students during their student teaching conducted individual 45-min interviews with the student teachers and mentor teachers. Questions from the protocols created by Nokes et al. (2008) were used for these interviews (e.g., "Describe the nature of your relationships in your triad"). Interviewers were given the same instructions on how to conduct the interviews to standardize their approach and minimize bias. Triad members were interviewed by the same individual. All interviews were audiotaped and then transcribed.

Field Notes of School Visits

Two members of the research team, Todd Pennington and Carol Wilkinson, were university supervisors of the student teachers. During their visits (minimum of six) to the schools to observe the students' teaching, they took field notes of their observations regarding triad relationships.

Semistructured Interviews of the Interviewers

The interviewers, Erin Whiting, Melissa Newberry, Erika Feinauer, and Janet Losser, took field notes of their observations during the interviews with the student teachers and mentor teachers. They were in turn interviewed as a group by Pennington and Carol Wilkinson, for further insight into the nature of triad relationships and subsequent effects of those relationships. The interviews were audiotaped and transcribed.

Data Analysis

To identify the perceptions of the triad student teaching placement model of the participants and the possible relationship, if any, to the key elements of CoP, we utilized an inductive content analysis (Lincoln & Guba, 1985) to analyze the qualitative data generated from the in-depth interview transcripts of the triads, university supervisors field notes, and the interview transcripts of the semistructured interviews of the interviewers.

We used the constant comparative method (Lincoln & Guba, 1985), which has been described as a process of categorizing (Glasser & Strauss, 1967), to compare and contrast each unit of information with all other units of information, as well as to unite those with similar meaning and to separate those with different meanings (Glasser & Strauss, 1967; Patton, 1980). These units of information were extrapolated from the raw data, consisting of a few words in a sentence to an extended paragraph. The categories that emerged containing similar units of information were cut and pasted into a computer file as well as printed out and placed on large poster boards for further analysis. As a result of this process, categories were established, and subsequently, the benefits and drawbacks of the triad experience, along with possible relationships to CoP, emerged from the data (Lincoln & Guba, 1985).

Member checking, or respondent validation (Creswell, 2007), corroborated the research findings with feedback gathered from the research participants during the interview process and after the conclusion of the study (via phone or email), increasing the credibility and validity of the study. For anonymity, we used pseudonyms for mentor teacher and student teacher names reported in the data. The

transcript data from the interviews and field notes were analyzed via inductive content analysis (Lincoln & Guba, 1985).

The use of a peer-debriefer was also a technique employed, establishing credibility and validity. Keven Prusak was not involved in the initial analysis and assumed the role of peer-debriefer to help clarify Pennington's and Wilkinson's interpretation of the data, explore possible biases, discuss research notes, and play the role of devil's advocate (Hanson & Newburg, 1992).

To increase credibility and manage researcher bias, we engaged in reflexivity: reflecting on our own points of view by keeping field notes and engaging in dialogue with peers (Johnson & Waterfield, 2004). We also used triangulation strategies to ensure credibility (Denzin & Lincoln, 2000). First, we triangulated using various forms of data collection, including interviews and field notes, and asked student teachers and mentor teachers similar interview questions that had been used in a previous study (Nokes et al., 2008). Second, we triangulated by involving several researchers in data collection and analysis, which provided multiple perspectives and thus reduced the likelihood of data misinterpretation.

To give the study credibility, we performed an inquiry audit. For the inquiry audit to occur, Pennington, who was the researcher primarily responsible for data analysis, prepared and maintained an audit trail. This audit trail consisted of four categories: (a) gathering raw data, (b) data reduction and analysis products, (c) data reconstruction and synthesis products, and (d) process notes (Lincoln & Guba, 1985). Amber Hanson and Liz Haslem, researchers who had no prior involvement in the study, performed the inquiry audit (Lincoln & Guba, 1985) and independently assessed the findings.

Results

The raw data for this study consisted of the 33 participants' transcribed interviews (from the 11 triads), observation notes, field notes, and weekly planning logs. These data points ranged from a short phrase in a sentence to an extended paragraph. As a result of the inductive content analysis, two global themes, the benefits and drawbacks of paired student teaching, emerged from the data related to the overall triad experience in student teaching.

Benefits of the Triad Experience

The global theme describing the benefits of this triad experience was made up of three categories: (a) quality feedback, (b) support, and (c) collaboration. This section describes the categories that make up the global theme of benefits.

Quality Feedback

Student teachers frequently described the benefits of having another student teacher as a partner observing and receiving immediate feedback about their lesson. Rebecca, a student teacher, described her experience:

> Partner feedback was actually very helpful. Because when you're just teaching by yourself, who knows if you're doing the right thing? And when we talked with each other they have this whole new opinion that you didn't even think of. They see it from a different point of view. So that was really, really helpful to talk it over. And even just watching each other's lessons, you can tell, "Oh theirs went better than mine because they did this," and then I change it for my next class just instantly.

Support

Student teachers said that having a partner, or sharing the experience, seemed to reduce their stress, to reduce their feelings of being overwhelmed, or to reduce their feeling of being alone. Jason, a student teacher, put it this way:

> Going into the student teaching situation, teaching, was a lot more comfortable because I knew there was someone in the exact same boat as me and because we knew each other from the same program we had similar styles, it made it a lot less stressful.

Collaboration

Student teaching partners were encouraged to plan lessons together and include their mentor teacher in this collaborative planning process. A benefit from this process was highlighted when mentor teachers said they felt able to learn new ideas, activities, and

creative ways to teach content. One of the more experienced mentor teachers, Kent, talked about this notion:

> I really liked having two student teachers . . . One of the things I've appreciated about this university program is that they bring fresh ideas. I've been out teaching a long time, I went to the same program but it's changed dramatically since. The kids are so much better prepared now than when I went through; that is, the biggest benefit is we collaborate and create new fun ideas . . . it just keeps me fresh.

Not only the mentor teachers benefited from the collaborative process regarding planning innovative quality lessons, but also the student teachers. Additionally, they experienced the emotional benefit of collaboration. A majority of triads mentioned that this collaborative process brought synergy to the group and that synergy in turn translated into greater enthusiasm in their teaching.

Drawbacks of the Triad Experience

The global theme describing the drawbacks of this triad experience was made up of four categories: (a) unrealistic experience, (b) laziness in preparation, (c) lack of quality feedback, and (d) personality mismatch. This section describes the categories that make up the global theme of drawbacks.

Unrealistic Experience

Several of the triads reported that the experience of rotating teachers every other class period and having a partner to help set up and take down equipment was not very realistic in preparing them for their first year of teaching alone. Bridget, a student teacher, reflected on this idea:

> When you've got two student teachers things usually just worked out, but in real life you aren't going to have that extra person always helping you . . . because we collaborated so much we didn't get a lot of planning and organization on our own, which we didn't necessarily get that experience of doing.

Laziness in Preparation

In some triads, it appeared that an alternating teaching schedule led to a few student teachers procrastinating in their planning because they knew they had plenty of time to prepare. This was clear in comments by Wes, who described his experience:

> I think having a student teaching partner could be bad because you get in the habit of having too much time . . . sometimes you don't think about prepping a day in advance. You say, "Oh well [my teaching partner] has first period so I can prep for second period during first period." This is something you probably have as a teacher. So I can see that becoming a bad habit.

In two of the triads, another challenge surfaced regarding laziness in preparation. One of the student teaching partners began to rely on what they perceived was a stronger partner when it came to planning and therefore did not carry equal load in the collaborative planning process. This led to frustration and discontent in the triad.

Lack of Quality Feedback

One challenge of the alternating teaching schedule was that student teachers had too much time to observe and became bored. As a result, several triads reported that as the semester wore on both their partner and mentor teacher provided less and less feedback when they taught. Danielle, a student teacher, described this lack of feedback in her triad:

> After about a week and a half of teaching [my mentor teacher] stopped coming into observe and spent time in her office working on other responsibilities. She's the head basketball coach, was working on organizing a school 5K run, or was in the teachers' lounge working on other things . . . the way paired student teaching was originally explained to me was there was supposed to be constant collaboration with our partner and when we turn in lesson plans to sit down and say, what are you doing, what am I doing, and observe each other . . . My partner and I are not that way . . . it was really stressful for us, so we just stopped doing it . . . we just worked on grading and other things while the other one taught.

Personality Mismatch

There appeared to be a fairly cohesive working relationship among the student teachers and their mentor in all but a couple of the triads. These are described as personality mismatches, where either the two student teachers did not mesh well or they did not get along with their mentor. The triads that experienced these dynamics reported significant stress and a lack of support. Kate, a student teacher, put it this way:

> I feel like I get along with people pretty good in general, but I think that is why this is the hardest thing because both my mentor teacher and student teaching partner are like perfectionist to a "T." I'm kind of a laid-back person, so sometimes the little tiny details are really huge to them. And [since I am a laid-back person] my mentor teacher has a tendency to tell me I'm boring. I'm not a boring person . . . I had a hard time staying positive, thinking, UGH, if I could just do this my way . . . it's just been a frustrating environment. If I don't do it like [my mentor teacher] wants, then my student teaching partner gives me totally different feedback.

Similar feelings of frustration caused by personality mismatch also surfaced in the case of several triads where one of the student teachers was a much stronger teacher than their partner. These personality mismatches resulted in some degree of dysfunction in the form of cessation of collaborative planning, minimizing of interactions with each other or the mentor teacher, seeking isolation, and determination to just "teach in their own way."

Discussion

This study explored participant perceptions of the triad student teaching placement model with respect to the tenets of a CoP. Wenger (1998) suggested that teachers in a CoP develop personal meaning and identities depending on their varied engagement in the key elements and the interaction of these elements that make up a CoP. These key elements are (a) mutual engagement, (b) joint enterprise, and (c) shared repertoire. The results of this study indicate the benefits and drawbacks that triads experienced through a semester of student teaching. The discussion now focuses on how the benefits and drawbacks relate to Wenger's CoP and the pertinent literature.

Wenger (1998) suggested that mutual engagement is the meaning people negotiate with one another through shared experiences. Student teachers who felt supported in their triad experienced significantly reduced anxiety levels through the process of mutual engagement. This supports the findings of Bullough et al. (2003), who reported that increased support is one of the advantages of the triad student teaching model. Morgan et al. (1994) and Pierce and Miller (1994) also reported student teachers and preservice teachers experience a decrease in feelings of loneliness as a result of using peer coaching and coteaching, which were both implemented in this study.

There was certainly a continuum of the degree to which student teachers felt support, or the lack of, in their triad. Those who experienced feeling a lack of support from their mentor teacher and/or partner seemed to connect such experiences to the categories of lack of quality feedback and laziness in preparation. Student teachers not receiving enough quality feedback from their mentor teacher and/or their partner or feeling as though their partner was lazy and allowed them to do a majority of the planning and preparation led to a lack of mutual engagement, a key element in CoP. This finding is inconsistent with those in other studies on the use of triads in student teaching that reported student teachers experiencing a great deal of emotional support through working with a partner and mentor who they felt was desiring their ongoing success (Bullough et al., 2002, 2003; Goodnough et al., 2009; Nokes et al., 2008). This notion of triads feeling supported leads to the key element of a joint enterprise within CoP.

Joint enterprise is a process in which teachers are in engaged and working toward common goals. It is the result of an ongoing process, not an event that is defined. Collaboration was the last category to emerge from the data as one of the benefits of a positive triad experience. Those triads who collaborated through lesson planning benefited from joint enterprise that produced new and creative ideas for both the student teaching partners and their mentors. Mentor teachers in the triads that created a joint enterprise reported a major benefit of learning fresh, creative, and innovative ideas. This supports one of the significant findings of Bullough et al. (2002), who found that triad models may revitalize mentor teachers who have lost some creativity through a lack of professional collaboration. Learning how

to collaborate to improve practice was also a significant finding of Bullough et al. (2003) and Nokes et al. (2008) in their studies of triads. The use of peer coaching in this study of triads further substantiates the value of such a strategy reported by Wynn and Kromrey (2000) to enhance preservice students' growth.

On the other hand, triads that experienced the drawback of having a personality mismatch may not have benefited from the key element of joint enterprise. In this study, two triads appeared to suffer from a significant personality mismatch. However, this does not necessarily mean that the triads did not benefit from the key element of joint enterprise unless they stopped observing and providing feedback, planning, and holding the daily triad evaluation meeting. Nokes et al. (2008) reported that without exception triads in their study experienced tension related to personalities, teaching philosophies, and discipline strategies. They further suggested that one of the keys to working through such periods of tension in a triad is dialogue between the student teachers. Working through tension and wrestling with difficult issues is all a part of triads learning to collaborate (Bransford et al., 2000; Mezirow, 2000).

One of the most commonly mentioned drawbacks was that the triad experience was unrealistic. Because of the alternating periods of teaching by the student teaching partners, many triads found they had a lot of time when they were not teaching, which led to boredom that translated into less mutual engagement, lack of support, and limited joint enterprise by the end of the experience. They felt less engaged because they wanted to spend more time teaching and less time in planning, observation, and reflection. Bullough et al. (2003) and Nokes et al. (2008) reported similar findings in their studies of triads and suggested it is a serious issue that the triad model may not address. Although the student teaching paired placement model may not be entirely realistic, it does allow for the development of a shared repertoire.

The key element of a shared repertoire is the way in which a learning community does things (e.g., tools, routines, common professional language). The category of quality feedback from peer to peer on each other's teaching and at least one formal evaluation each day with the mentor teacher produced a shared language, ideas to improve their teaching, and new ideas for the mentor teacher. This key element was evident in the triads that reported quality feedback

as one benefit of the experience. These findings provide additional evidence to Bullough et al.'s (2003) finding that an advantage to the triad student teaching placement concept is ongoing conversation about teaching and Nokes et al.'s (2008) finding that ongoing dialogue and quality reflections grow out of the triad experience. This finding specifically supports the action research strategy of implementing cogenerative dialogue as a part of the student teaching triad placement model reported by Roth and Tobin (2002) and Tobin and Roth (2005) as a part of coteaching.

However, in those triads that did not seem to develop much of a shared repertoire, there were concerns with the lack of quality feedback from their mentor teacher and there was a sense of competition with their student teaching partner, which thus compromised the value of their partner's feedback. Goodnough et al. (2009) reported competition as a limiting factor of the triad placement model. The finding in this study that student teachers lack quality feedback is consistent with the findings in both Bullough et al. (2002) and Bullough et al. (2003), who reported that student teachers in a triad situation desire more quality feedback from their mentor beyond the mechanics of planning together for the next day's lesson.

In conclusion, it appears that those triads that reported more of an overall positive relationship among the three members making up their CoP experienced greater meaning and stronger identities as teachers. On the other hand, those triads that reported a much less satisfying experience did not experience the same positive feelings in regard to enhanced meaning and strengthened teacher identities. The findings from this study indicate that triad placement of student teachers is certainly not perfect but that the benefits overall seem to outweigh the cited drawbacks. However, the findings from this study may lead to possible enhancements that minimize the cited drawbacks of the triad placement model.

The findings of this study have implications for university faculty who are engaged in teacher education, and the placement of student teachers, and possibly for future mentor teachers who are asked to participate in a triad student teaching experience. We make three recommendations.

First, we recommend a hybrid triad student teaching model based on the one implemented in this study. We recommend that student teachers spend the first half (7 weeks) of their student

teaching experience in a triad situation, benefiting from the reduced stress and workload while getting their feet wet teaching. This would be followed in the second half of the semester by a single placement situation, allowing them a more realistic experience as they teach a full day. This concept of balancing autonomy along with learning to collaborate successfully through such an experience is supported by Bullough et al. (2003) in their findings of the triad model.

Second, we highly recommend that teacher education faculty develop in-service training for mentor teachers and preservice teachers who are going to be in a triad experience. This in-service training would be held prior to the beginning of the student teaching experience. The in-service environment would allow triad members and university supervisors to discuss specific expectations regarding observation time, feedback quality and frequency, strategies for working through periods of tension, and in-school application of the key elements of a CoP.

Last, we recommend teacher education faculty and student teaching supervisors develop and participate in student teaching seminars that are ongoing over the course of the student teaching experience. The content of these seminars over the course of the semester would build on the expectations and topics discussed during the initial in-service training prior to the semester. We recommend a balance with some seminars for mentor teachers, some for student teachers, and some the entire triad. The use of such ongoing seminars could minimize the drawbacks identified in this study and therefore provide a rich professional experience for all members of the triads.

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PEDAGOGY

Evaluation of an Intervention to Increase Student Motivation and Enrollment in Physical Education

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Abstract

This study examined the influence of a 4-month intervention on students' motivation in Grade 10 physical education and enrollment in elective physical education. Health Promoting Secondary School Physical Education (HPSS PE) was designed to improve students' psychological need satisfaction in physical education, based on self-determination theory. A matched comparison pre–post design was used with 10 schools (5 intervention, 5 usual practice). Students (N = 373) completed questionnaires that assessed perceptions of autonomy, competence, and relatedness, and school personnel provided enrollment information. Results indicated that HPSS PE was not effective in increasing participants' psychological need satisfaction; however, female students receiving the intervention were significantly more likely to enroll in elective physical education. Insights contribute to the evidence about creating need-supportive environments in physical education and improving enrollment rates in elective programming.

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It has been widely acknowledged that school-based physical education programs can play a critical role in positively influencing students' attitudes toward, and patterns of, physical activity (Alderman et al., 2012; Bassett et al., 2013; Chen et al., 2014; Trudeau & Shephard, 2005). Young people who have positive experiences in physical education will more likely engage in physical activity outside of school and are more prone to continue this involvement throughout life (Haerens et al., 2010; Shen et al., 2007; Shephard & Trudeau, 2000). However, despite such promise, many students report negative experiences in physical education (Rikard & Banville, 2007; van Daalen, 2005), a lack of motivation to participate in physical education (Mowling et al., 2004; Ntoumanis, 2001; Ntoumanis et al., 2004), and low participation in elective physical education courses (Gibbons, 2009; Sulz et al., 2010).

The motivational processes influencing the participation and experiences of students in physical education programs are garnering research attention. This interest stems from the association between student motivation during physical education lessons and positive physical and affective consequences. Students' motivation in physical education class has been linked to effort (Ntoumanis, 2001; Ntoumanis et al., 2004; Taylor et al., 2010), levels of physical activity during class time (Cox et al., 2008; Lonsdale et al., 2009), intensity of involvement (Biddle & Mutrie, 2008), intention to engage in physical activity during leisure time (Lim & Wang, 2009; Shen et al., 2007), and participation in elective physical education (Ntoumanis, 2005; Shen, 2010). In addition, student motivation has been associated with increased enjoyment, interest (Zhang, 2009), and higher positive affective states during physical education class (Ntoumanis, 2005). It is, therefore, important to understand the motivational processes that influence whether students are motivated in physical education and regard physical education as an enjoyable and rewarding experience, or are unmotivated in physical education and regard physical education as boring and worthless (Ntoumanis, 2001).

Theoretical Framework

A theoretical framework that is commonly used in the study of motivation in physical education settings and that offers insight into the motivational process of students in physical education is Deci

and Ryan's (1985) self-determination theory (SDT). SDT posits there are three basic needs to which humans strive to satisfy: autonomy (i.e., a sense of choice), competence (i.e., a sense of efficacy), and relatedness (i.e., a sense of social connection). The satisfaction of these needs will enhance personal motivation toward behavior and in turn result in positive consequences (Deci & Ryan, 1985, 2000). Specifically, if students' needs for autonomy, competence, and relatedness are met, they could experience elevated levels of intrinsic motivation. In contrast, when these basic psychological needs are thwarted, the associated benefits are diminished and low motivation or avoidance will result (Deci & Ryan, 2000).

In physical education settings, a large portion of the literature has focused on the correlation and/or mediation of the theoretical propositions of SDT on students' motivational state and associated outcomes (e.g., How et al., 2013; Lim & Wang, 2009; Ntoumanis, 2001; Rutten et al., 2012; Standage et al., 2003). For example, numerous studies have documented that students' perceived autonomy support from physical education teachers positively predicted intrinsic motivation in physical education settings (How et al., 2013; Lim & Wang, 2009; Standage et al., 2003). Further, emphasis on students' improvement and the reduction of interpersonal ability comparisons can satisfy students' need for competence (Ntoumanis, 2001) and physical education teachers' relatedness support has been associated with students' state of motivation (Cox & Williams, 2008; Ferriz et al., 2013; Shen et al., 2009). In addition, Ntoumanis (2005) found that students' psychological need satisfaction was related to students' enrollment in elective physical education courses the following year, suggesting that students in elective courses may have decided to enroll in optional physical education based to some degree on psychological need satisfaction.

Although these noted studies and others have contributed much to the literature and have informed the associations between the basic psychological needs posited by SDT and positive outcomes, the majority of research has been cross-sectional and correlational in nature. A few studies have attempted to manipulate the psychological need for autonomy to increase specific targeted behaviors (e.g., physical activity, autonomy support) in physical education settings. These studies have been short-term researcher-controlled

interventions with a primary focus on satisfaction of autonomy through free-choice "open-gym" periods (e.g., Lonsdale et al., 2009, 2013) and activity selection (e.g., Ward et al., 2008) with little focus on curricula objectives. These studies emphasized the importance of providing choices in physical education to help increase students' physical activity during class time and autonomy support. However, it is important to recognize that physical education classes have multiple objectives beyond physical activity, including skill development and general health and physical education (Lonsdale et al., 2009). Therefore, this type of autonomy-supportive environment, in which students are given equipment in an "open-gym" concept or choices between two activities, may not be practical or may be an often-repeatable lesson format due to other curricular demands.

Although these intervention studies have enhanced our understanding of how meeting students' autonomy needs can increase student motivation in physical education, SDT posits that the degree of achievement of self-determined motivation is dependent on three psychological needs. Van den Berghe et al. (2014) conducted a systematic review of SDT-grounded work in physical education and identified the need not only for studies that examine all three need-supportive practices but also for more intervention studies overall and for those that account for more contextual factors. Specifically, we identified research gaps and areas for future work, including (a) combinations of the three dimensions of need-supportive practices, (b) more intervention studies, and (c) relevant physical education contextual factors taken into account.

Thus, although SDT has been extensively studied within physical education, limited intervention research is available. Further, a program that is flexible enough to be applied in diverse physical education contexts and activity units and that is consistent with physical education curricula objectives is warranted.

Background

Health Promoting Secondary Schools Physical Education

A SDT-based physical education curricular intervention component (HPSS PE) was designed as part of a study entitled Health Promoting Secondary Schools (HPSS; Wharf Higgins et al., 2013). HPSS has been described previously (Wharf Higgins et al., 2013), but

in short is a 1-year "whole-school" intervention designed to improve the physical activity and eating behaviors of Grade 10 students in five intervention schools and five usual-practice high schools. HPSS includes changes to school policies, school environment, curricular activities (physical education and health education), and student leadership opportunities. In line with SDT, a choice-based design in which participants were required to deliver the HPSS intervention core components was offered, but specific intervention pieces and implementation details were tailored to the needs of individual school communities (Sulz, Gibbons, et al., 2016; Wharf-Higgins et al. 2013).

HPSS PE is one of the core curricula components of the larger HPSS study. HPSS PE was designed based on SDT to enhance students' psychological need satisfaction in Grade 10 physical education and increase enrollment rates when physical education becomes an elective in Grade 11. HPSS PE incorporates autonomy (e.g., choice of group members, choice of activities taught within the course), competence (e.g., skill development, optimally challenging learning activities), and relatedness (e.g., class team-building activities) within physical education lessons.

Our research contributes to the understanding of motivational processes in physical education by examining the effect of the HPSS PE intervention on students' basic psychological need satisfaction and enrollment in Grade 11 elective physical education programs.

Method

Research Design

Ten schools within a western Canadian province were matched on geographic and demographic characteristics and randomized to either an intervention or a wait-list usual-practice condition for 1 school year. The physical education–specific pre–post investigation described in this article was nested within the larger HPSS study.

Participants

Grade 10 students enrolled in participating schools were invited to take part in the pre- and postintervention measures. We recruited Grade 10 students for two main reasons: (a) Grade 10 is the final year of compulsory physical education in the participating province

and (b) to evaluate the effectiveness the HPSS PE component on Grade 10 students' enrollment rates in Grade 11 elective physical education. Participants (N = 373; M_{age} = 15.32 years, SD = 0.37) were enrolled in 39 physical education classes from the 10 participant high schools (22 classes from intervention schools, 17 classes from usual-practice schools). School demographics showed a mean household income of $80,097 and 25% of students identified as a visible minority, 7.4% of First Nations heritage. Of the 22 Grade 10 physical education classes receiving the HPSS PE intervention, five were gender-segregated (3 all girls, 2 all boys) and 17 were coeducational classes. Fifteen high school physical education teachers taught the HPSS PE component across the five intervention schools (5 females, 10 males). Participating teachers had an average of 11.2 years teaching experience (SD = 5.14; range of 4–20 years) and 7.2 years experience teaching Grade 10 physical education (SD = 4.81; range of 1–16 years). Table 1 presents information on the overall numbers of students who participated in the evaluation of HPSS PE.

Table 1
Participants' Sex and Age by Condition

Variable	Total (*n*, *SD*) (*N* = 373)	HPSS PE (*n* = 194)	Usual practice (*n* = 179)
Sex			
Female (%)	182 (48.8)	103 (56.6)	79 (43.4)
Male (%)	191 (51.2)	91 (47.9)	100 (52.4)
Age, *M* (*SD*)	15.32 (0.37)	15.25 (0.34)	15.39 (0.38)

HPSS PE Intervention

HPSS PE teachers received a resource (hard copy binder and electric copy via USB) that included promotional ideas for increasing enrollment in Grade 11 elective physical education programs, classroom instructional strategies, ready-to-use lessons and examples of effective activities/actions to enhance students' perceptions of autonomy, competence, and relatedness. For example, some of these strategies included engaging students in decision-making processes by offering choices such as activity selection, difficulty of task, and partner or equipment choices; creating learning environments where

individual self-improvements are emphasized over social comparisons, competitive play is minimized, and goal setting is taught; and establishing meaningful connections and acceptance in which support and encouragement underpin teacher philosophies and activities are implemented to enhance relationships among classmates. Ideas for promotion of Grade 11 elective PE were included in the HPSS PE resource and based on previous research. For example, Sulz et al. (2010) identified factors influencing intention to enroll in Grade 11 elective physical education, such as "lack of knowledge" regarding the Grade 11 programs and "teacher promotion" of elective physical education courses. HPSS PE teachers were encouraged to provide Grade 10 students with information regarding the Grade 11 course and engage in promotional activities. Table 2 provides actions that physical education teachers can use in their lessons to foster the psychological needs of SDT.

The HPSS PE component was implemented over one semester (approximately 4 months). Teachers participated in a workshop (approximately 1 to 2 hr) at the beginning of the school semester to familiarize themselves with the resource. A trained HPSS Facilitator was available throughout the HPSS to assist and support teachers with the planning of the HPSS PE component and visited each school site bimonthly. We asked physical education teachers to deliver the HPSS PE intervention components with choices regarding which actions they implemented into their courses allowing for flexibility and a context-specific program.

Implementation Levels

To understand implementation levels, we asked Grade 10 physical education teachers to keep track of their actions in a purpose-built tracking tool. Activities were recorded by SDT construct and using a fixed HPSS options list. Tracking tools were submitted to the HPSS Facilitator by email or in person at the completion of the intervention. Table 3 shows the mean SDT actions that teachers implemented into their physical education class. Table 4 provides examples of elective physical education promotion activities implemented in intervention schools.

Table 2
Application of SDT to HPSS PE

Actions	Autonomy	Competence	Relatedness
Curricula activities	Survey students about physical activity preferences Provide choice around what will be assessed	Focus on the development of skill and ability Provide student leadership opportunities	Include team-building activities Include activities where everyone is on the same level
Learning environment	Provide choices in game play Choice in physical activity attire Offer competitive and noncompetitive activities	Focus on improvement, effort, and enjoyment Avoid social comparisons Provide optimally challenging activities	Create a safe, supportive, and caring learning space Encourage inclusive language and respect for diversity
Teacher behaviors	Allow for student input Engage students in the decision-making process	Provide opportunity for regular self-assessment Offer constructive feedback	Establish meaningful connections Enhance peer relationships Focus instructional strategies on social connectedness and collaboration

Note. Adapted from "Girls Getting Active: Exploring a Physical Education Program Tailored to Young Women," by L. A. Pfaeffli and S. L. Gibbons, 2010, *PHEnex Journal*, 2(3), 1–21, and "Relatedness-Supportive Learning Environment for Girls in Physical Education," by S. L. Gibbons, 2014, *LEARNing Landscapes*, 7(2), 139–150.

Table 3
Implementation of HPSS PE Intervention

Actions/activities/lessons	*M*
Autonomy	9.64
Competence	11.71
Relatedness	5.28
Promotion of Elective PE	2.2

Table 4
Examples of Activities Used to Promote Enrollment in Elective Physical Education

Activities Used for Promotion of Enrollment in Grade 11 Elective Physical Education
• Physical Education Department Head went into all Health Education 10 and Physical Education 10 courses to discuss and promote Grade 11 elective physical education. • Physical education teachers approached individual students to encourage enrollment. • Students enrolled in Grade 11 elective physical education went into Grade 10 physical education classes to discuss their experiences, explain the course, and encourage student enrollment. • Grade 10 physical education students participated in "a week in Grade 11 physical education" to provide students with a "taste" of elective physical education.

Measures

Psychological Need Satisfaction and Perceptions of Autonomy, Competence, and Relatedness

We used the Physical Education – Autonomy, Relatedness, Competence Scale (Sulz, Temple, & Gibbons, 2016) to measure overall psychological need satisfaction and perceptions of autonomy, relatedness, and competence of students in high school physical education classes. Students responded on a 7-point likert scale (1 = *strongly disagree* to 7 = *strongly agree*) to the stem question "When I am in physical education…" followed by items representing autonomy (e.g., "I am doing the activities I want"), relatedness (e.g., "my classmates seem to like me") and competence (e.g., "I am

good at the things we do"). This questionnaire provides an overall psychological need satisfaction score (i.e., the degree in which students' psychological needs of autonomy, relatedness, and competence are satisfied) and the degree to which the person experiences satisfaction of each of the three needs. Validity and reliability of scale factor structure in high school physical education has been shown previously (Sulz, Temple, & Gibbons, 2016). The questionnaire was administered to students during physical education class time at the beginning of the semester (i.e., baseline, September) and at the end of the semester (i.e., postintervention, December/January).

Enrollment in Elective Physical Education

To assess whether HPSS PE influenced participants' enrollment in optional physical education in Grade 11, we collected the status of Grade 11 elective physical education enrollment (i.e., enrolling or not enrolling) from intervention and usual-practice schools. Enrollment data were collected at the end of the intervention year with the help of school personnel at each participant school. School personnel were provided with a list of names of the participants and asked to indicate by selecting "yes" or "no" whether each student was enrolled in Grade 11 physical education for the following school year.

Analyses

Analysis included multivariate analysis of covariance (MANCOVA), a chi-square analysis, and the mean and range of the actions recorded in teacher tracking tools. To measure students' overall psychological need satisfaction scores, we summed each subscale (autonomy, relatedness, competence) together and used a single score as an indicator of students' overall psychological need satisfaction toward Grade 10 physical education. The Physical Education – Autonomy, Relatedness, Competence Scale (Sulz, Temple, & Gibbons, 2016) comprises 12 items on a 7-point scale; therefore, students' psychological need satisfaction could range from a score of 12 (lowest need satisfaction) to 91 (highest need satisfaction). To measure students' need satisfaction for each individual SDT construct, we took the mean score of the series of questions from each construct and used it for analysis. For example, autonomy was measured based on the mean score of four questions related to

students' perceptions of autonomy in their Grade 10 physical education class.

We used SPSS 21.0 to analyze data. We performed a MANCOVA to test whether students' psychological need satisfaction and perceptions of autonomy, competence, and relatedness toward Grade 10 physical education differed between conditions. Postintervention scores served as the dependent variables, condition as the independent variable, and baseline scores as covariates. We calculated effect size (partial η^2) to determine the relative magnitude of the experimental treatment, using the following formula: Partial η^2 = SS(effect) SS(effect) + SS(error for that effect). Partial eta squared was interpreted as small (.01), medium (.06), and large (.14; Cohen, 1988).

To compare HPSS participants' enrollment in Grade 11 elective physical education between intervention and usual-practice schools, we used chi-square analyses. Three chi-square analyses were conducted. The first focused on overall HPSS participant enrollment (i.e., female and male participants), whereas the second and third analyses focused on gender differences in enrollment rates.

To analyze implementation data, we counted and categorized actions recorded in teacher tracking tools based on SDT constructs and use of HPSS resources. We calculated mean and range for each SDT construct.

Results

Baseline

Table 5 displays the descriptive statistics for the baseline and follow-up measures of and change scores for psychological need satisfaction and perceived autonomy, competence, and relatedness by condition. No significant differences in psychological needs satisfaction, autonomy, competence, or relatedness between the conditions were observed at baseline, Wilks' $\Lambda = .983$, $F(4, 369) = 1.596$, $p = .175$, $\eta^2 = .017$. Significant associations between the proportion of students currently enrolling in Grade 11 physical education and intervention condition were demonstrated by the chi-square test of association ($p = .000$). A significantly greater proportion of usual-practice school students (52%) were enrolled in Grade 11 elective physical education compared to students at intervention schools (42%; $p = .000$). In addition, there was a significantly ($p = .003$) greater proportion of

Table 5
Significance of and Descriptives for Psychological Need Satisfaction (PNS Score) and Perceived Autonomy, Competence, and Relatedness by Condition

Dependent variable	Condition	Baseline (T1) Sum ± SD (Range for PNS)	Follow-up (T2) Sum ± SD (Range for PNS)	Change	Sig.
PNS score	HPSS PE	71.80 ± 11.94 (20.00–89.00)	73.24 ± 11.89 (24.00–90.00)	+ 1.44	NS
	Usual Practice	74.44 ± 12.74 (40.00–91.00)	74.06 ± 11.75 (25.00–91.00)	− .38	NS
Perceived autonomy	HPSS PE	4.29 ± 1.06	4.51 ± 1.10	+ .22	NS
	Usual Practice	4.50 ± 1.33	4.49 ± 1.26	− .01	NS
Perceived relatedness	HPSS PE	5.49 ± 1.07	5.54 ± 1.06	+ .05	NS
	Usual Practice	5.66 ± 1.06	5.68 ± 1.00	+ .02	NS
Perceived competence	HPSS PE	5.43 ± 1.02	5.52 ± 1.02	+ .09	NS
	Usual Practice	5.61 ± 1.07	5.66 ± .92	+ .05	NS

Note. Psychological need satisfaction (PNS Score) could range from a score of 12 (lowest need satisfaction) to 91 (highest need satisfaction). Perceived autonomy, relatedness, and competence scores were on a 7-point scale (1 = *lowest need satisfaction*; 7 = *highest need satisfaction*).

female (38%) and male (66%) students in usual-practice schools enrolled in elective physical education compared to female (29%) and male (55%) students in intervention schools.

Outcome Measures

Psychological Need Satisfaction and Perceptions of Autonomy, Competence, and Relatedness

The MANCOVA showed no significant differences for any variables between conditions at follow-up while controlling for baseline, Wilks' $\Lambda = .991$, $F(4, 369) = .867$, $p = .484$, $\eta^2 = .009$.

Enrollment in Elective Physical Education

No significant associations were found for the proportion of students enrolling in Grade 11 at follow-up and intervention condition for all participants ($p = .272$). Gender analysis showed a significant association ($p = .013$) in the proportion of female participants enrolling in Grade 11 elective physical education across condition: 48% in the intervention schools compared to 30% in the usual-practice schools. See Table 6.

Discussion

The HPSS PE intervention aimed to increase Grade 10 students' perceptions of autonomy, competence, and relatedness, and improve enrollment in elective Grade 11 physical education. Specifically, HPSS PE altered features of existing physical education environments (e.g., curricula activities, learning environment, teacher behaviors) to meet the three basic psychological needs posited by SDT and to align with curricula outcomes. A unique aspect of the HPSS PE component was the choice-based design in which emphasis was placed on the specific needs and preferences of the participating students and teachers. Overall, the results showed no significant difference in autonomy, competence, and relatedness between the intervention schools and usual-practice schools. However, HPSS PE intervention was positively associated with enrollment in Grade 11 physical education among female participants.

The absence of an effect on SDT factors may be related to implementation levels. The number of intervention actions carried out in physical education classes was low. The implementation level may be attributed to factors related to the HPSS program, such as the

Table 6

Enrollment in Grade 11 Elective Physical Education by Condition at Follow-Up

	Follow-up														
	Total participants (N = 2031)					Female participants (*n* = 992)					Male participants (*n* = 1039)				
	Enrolled		Not enrolled			Enrolled		Not enrolled			Enrolled		Not enrolled		
Condition	*n*	%	*n*	%	*p*	*n*	%	*n*	%	*p*	*n*	%	*n*	%	*p*
HPSS PE	101	52	93	48	.272	50	48	53	52	.013	47	52	44	48	.245
Usual practice	83	46	96	54		24	30	55	70		60	60	40	40	

choice-based design and the complexity of targeting all three SDT constructs (e.g., too much choice). The choice-based design of HPSS PE was based on SDT; comprehensive school health tenets (Beaudoin, 2011); and education and health promotion literature that emphasizes the importance of pragmatic methods, contextual relevance, and stakeholder engagement (Glasgow, 2013). For example, educational change literature has suggested that the integration of new programs into existing school practices is more likely when the autonomy of teachers and students is considered, when their voices and ideas are heard and incorporated (Fullan, 2007; Niemiec & Ryan, 2009; Reeve, 2012). Previous school-based motivational studies have been primarily short-term (one lesson or one unit), highly controlled programs focused on the manipulation of one psychological need, most often the need for autonomy. That is, teachers were given a short preset activity or lesson developed by researchers and students' motivation was assessed directly prior to and following the activity (e.g., Lonsdale et al., 2009, 2013; Ward et al., 2008). Although some researchers (e.g., Bryan & Solmon, 2007; Taylor et al., 2010) have suggested physical education settings would be an ideal setting for intervention studies to target all three SDT constructs, we suspect that this was too demanding for the participant teachers, considering the duration of the intervention. This aligns with the literature examining school-based intervention implementation, which suggests that as intervention complexity and time requirements from those responsible for implementation increase, the level of treatment integrity decreases (Lane et al., 2004; Storey et al., 2016). Future research is needed to explore and better understand the 'optimal' level of choice.

A second possibility for the nonsignificant findings could be high baseline scores, creating a ceiling effect. Within the literature, cross-sectional studies conducted with high school students revealed lower baseline means than our sample (e.g., Standage et al., 2005, 2012; Taylor et al., 2010). One challenge in SDT-based randomized controlled trials (similar to the larger HPSS intervention) concerns the characteristics of the participants (Fortier et al., 2010). Participants who tend to volunteer for physical activity–based studies also had elevated initial levels of motivation (Duda et al., 2009; Fortier et al., 2007; Silva et al., 2008). The baseline scores of our

participants showed high levels of motivation. Our participants were students from the larger HPSS study sample (Wharf Higgins et al., 2013), in which participants volunteered to complete physical testing (i.e., 20-m shuttle run) and anthropometric measures (i.e., weight, height, waist circumference, hip circumference) in addition to the completion of the questionnaires within this study. Due to the data collection procedures of the larger HPSS study, which included physical tests, it is likely that participants were highly motivated toward physical activity.

Corresponding with the high baseline perceptions on SDT constructs were the Grade 11 elective physical education enrollment rates. Both school-level and student-level enrollment appeared higher than the provincial average (28%). Similarly, it appeared that the physical education programs offered to students in the usual-practice condition were meeting their basic psychological needs. Perhaps the teachers in the usual-practice schools who volunteered for this study may have already been providing a Grade 10 physical education program that met the needs of their students. Fortier et al. (2010) concluded that such intuitive support in the usual-practice conditions will likely result in smaller intervention effects. They stated that this issue merits assessment of treatment integrity in the usual-practice conditions. Our program did not assess treatment integrity in the usual-practice conditions nor were students blinded to the HPSS intervention components (students in the waitlist control groups were promised the intervention the next year).

In examinations of the SDT constructs individually, students' perceptions of autonomy, competence, and relatedness remained relatively stable pre- to postintervention. For perceptions of autonomy, research has effectively increased students' perceived autonomy in physical education classes through free-choice periods (e.g., Lonsdale et al., 2009, 2013) and activity selection (e.g., Ward et al., 2008). These studies have been short-term (e.g., 20-min activities, one unit), high-dose (e.g., free-choice lesson; choice of one of two activities) interventions with postmeasure occurring directly after choice was offered. Unique aspects of the HPSS PE Grade 10 intervention were the alignment to curricula outcomes and the ability to integrate activities and lessons throughout a physical education program. However, the intervention dose (frequency and length) may be inadequate for enhancing perceptions of autonomy.

Despite the efforts of the HPSS PE program to target age-salient sources of competence (e.g., enhancement of self-comparison, optimally challenging activities, and internalized standards such as improvement, effort, and enjoyment) and to follow recommendations in the literature (e.g., Alderman et al., 2006; Bryan & Solmon, 2007), no significant differences were found for students' perceptions of competence between conditions and their perceptions remained relatively stable across time periods. One plausible explanation for this may be that by the time students enter Grade 10, their perceptions of competence related to physical education and physical activity may already be established. Studies aimed at enhancing younger children's perceptions of competence in physical activity settings have been effective (e.g., Fu & Gao, 2013; Valentini & Rudisill, 2004), but similar to ours, the limited studies conducted with adolescents have had no discernible effect on perceptions of competence (Wallhead & Ntoumanis, 2004). Moreover, Li et al. (2005) and Bryan and Solmon (2007) stated that past experiences could influence perceptions of competence. Longitudinal studies tracking students' perceptions of competence toward physical education over the school years are limited; however, a study conducted by Barnett et al. (2009) found that being physically competent during childhood was influential in positive perceptions of sport competence in adolescence. This suggests that a person's perceptions of competence during childhood influence perceptions of competence during adolescence. Further, Deci and Ryan (1985) proposed that motivation is not solely experienced at situational levels (i.e., physical education class) but also experienced at global levels (i.e., across various life contexts). Based on this, students' motivation in a physical education course (i.e., a person's situational motivation) may be influenced by their global motivation in different contexts (e.g., previous physical activity experience). Although this is one plausible explanation, more research needs to evaluate whether high school students' perceptions of autonomy, competence, and relatedness toward physical education are established and perhaps less malleable to change strategies by adolescence.

The outcomes of our investigation also revealed that relatedness perceptions did not differ significantly by condition. There is limited information about enhancing social connection and relationships

in physical activity and physical education settings. According to Ntoumanis (2001) and Deci and Ryan (2000), relatedness in physical activity settings is a lesser consequence on a person's motivational processes than autonomy and competence. However, physical education is a unique context where students interact with other students regularly and where their physical abilities are placed on display. It is, therefore, important that social connectedness is established between students, their peers, and their teacher for students to be motivated (Cox et al., 2009; Cox & Williams, 2008). Unfortunately, the implementation dose for relatedness activities was the lowest among the SDT constructs, making it difficult for us to conclude that interventions would have no effect. Future studies should address this with greater dose to determine if relatedness needs can be changed.

Despite null findings related to needs satisfaction, enrollment rates were proportionally higher among female students in the intervention schools. On the surface, these findings suggest that improving students' experiences in physical education courses and meeting the needs posited by SDT may positively influence students' enrollment in elective physical education programs. However, it may also be the influence of an extraneous external factor such as the promotion of the elective courses by other actors in the school (HPSS actions noted in Table 6). Research has identified factors influencing enrollment intention in elective physical education programs among Grade 10 students (Sulz et al., 2010). Findings revealed a barrier to enrollment was a lack of knowledge regarding the Grade 11 physical education program. Students reported being unaware and uniformed about the Grade 11 physical education course. The authors suggested educators need to provide students with information prior to their selection of courses to help promote student enrollment. Our findings highlight the importance of teachers promoting enrollment and providing information on physical education elective courses to their students.

Our study has several strengths including the randomized comparison design and the strong theoretical framework informing intervention strategies. In addition, schools in our study are diverse in characteristics and geographical location, enhancing generalizability. Furthermore, the HPSS PE component is novel in that it targets all three psychological needs proposed by SDT. The HPSS PE

component contributes to the motivational literature in that it examines students' motivational processes for the duration of one high school physical education course. Moreover, HPSS PE is designed to be integrated into the existing practices of school-based physical education programs and to align with curriculum objectives and thus offers feasible and context-relevant pedagogical strategies. Most uniquely to HPSS PE, teachers are given choices and flexibility within the framework of the intervention. This allows for a program that could be adapted by the teachers to meet the specific needs of their school and their students.

Our study also has a few limitations. First, participant schools were invited to be part of this study focused on enhancing student motivation toward physical activity and physical education. As such, schools may have been serving the psychological needs of their students at the outset, which could explain the high baseline scores and enrollment rates of the intervention and usual-practice schools. Second, students who volunteered for the study also consented to the larger portion of HPSS. This larger aspect of our study involved more rigorous (albeit feasible and affordable) measurements (i.e., physical measurements, 20-m shuttle run), constraining the pool of participants who volunteered to take part in the investigation to the already active and motivated. Clearly, future research needs to employ alternative measurement tools that attract and engage the entire student body, not merely the fit and enthusiastic. Last, the lack of process evaluation data in the usual-practice schools limits our understanding of the activities (including need-supportive activities) and environment that the usual-practice schools provide their students.

In conclusion, the HPSS PE component supports a choice-based framework that promotes perceptions of autonomy, competence, and relatedness in high school physical education settings. It also supports the promotion of elective physical education programs. This approach appears to contribute to physical education enrollment. Studies of longer duration intervention might be necessary (i.e., over several semesters) and program complexity and its effect on implementation needs to be considered in future interventions. Insights gained from our study contribute to the practical understanding of SDT intervention development, implementation, and practices in high school physical education programs.

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PEDAGOGY

Gender Differences in Student-Designed Games

Mauro André and Peter Hastie

Abstract

Given the concern of presenting physical education environments that promote equity, it is appropriate to study innovations that can achieve that goal. In this study, that innovation took the form of student-designed games (SDG). SDG is the process in which students create, practice, and refine their own games and in which the teacher acts more as a facilitator. In this project, we focused the influence of gender on two main topics with a cohort of 82 junior high school students in ten 75-min lessons over 5 weeks. These topics were (a) enjoyment and engagement and (b) game design outcomes. The research was conducted under case study design and involved three sources of data (field notes observations, focus group interviews, and survey). The quantitative data indicated that although all students appreciated the opportunity to design their own games, girls enjoyed the SDG process more than boys did. Further, from the interviews and observations, three themes related to students' enjoyment/engagement were generated and a notable difference was observed in terms of game design outcomes. The students said that they "enjoyed being able to work with groups chosen by themselves," that they did not believe that "boys and girls work well with the opposite sex," and that "playing games with your own group members is preferable." In terms of game design outcomes, girls created more ludic games, whereas boys created more strategic games. These findings show that SDG may be a powerful mechanism for empowering girls within physical education.

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Society has promoted many forms of hierarchy based on ethnicity, religion, origin, culture, sexual orientation, and gender. Although physical education should be a site that minimizes prejudices, ample evidence suggests that it has served to reinforce segregation, emphasizing differences rather than promoting a reflexive play that would promote an understanding about diverse values (Flintoff & Scraton, 2001; Penney, 2002; Valley & Graber, 2017).

As an example, many sport-based physical education programs have led to competitive environments that extend beyond the teacher's control. Stimulating the promotion of a few high skill students and excluding many low skill students, these environments have a particularly negative effect on girls (Hills, 2007; Hickey, 2008; Constantinou et al., 2009). Ennis (1996) has presented these examples of sport dominance and student exclusion as some of the reasons why "more than apologies are necessary" (p. 453) to many students within physical education lessons.

Although many feminist scholars have noted that a shift in physical education approach may produce significant changes in girls' participation (Ennis, 1999; Enright & O'Sullivan, 2010; Scraton, 2018), most physical education curricula still present sport-based activities as the predominant content, highlighting gender differences and promoting disagreements (Azzarito & Solomon, 2005).

Dealing with undesired curriculum options; facing social challenges by teachers, peers, and even parents; having a poor image about their own abilities; and suffering sexuality prejudice harassments are all scenarios that constitute the physical education environment in the eyes of many girls. In seeking active alternatives, Azzarito et al. (2006) reported that girls were more willing to avoid issues that promote exclusion than to seek solutions to overcome them. For example, these authors reported that if female students had a choice, they would rather focus on activities such as tennis and badminton because they considered these more enjoyable because they were easier to play (i.e., having a better self-perception about their ability) and because they were able to play for fun (i.e., without overstressed competition). The same study also reported that girls would avoid activities that were predominantly played by boys (e.g., basketball), as well as other activities they considered to be too competitive and aggressive, because boys would criticize their performance.

In the aforementioned study, girls only oriented their choices based on what they had learned in physical education classes, with those choices often being limited to the lesser of many evils. The first study to address content itself was Oliver et al. (2009), who allowed and encouraged disengaged girls to modify games and activities that they knew, to promote higher levels of engagement. The outcome of that study was the presentation a book of activities that the girls were able to play and enjoy.

The idea of empowering students with the opportunity to design their own activities inverts the paradigm in which they must learn several new skills and adapt themselves to predefined rules. Hence, students are given an opportunity to create activities that intimately relate to their interests and skills and in which they are more likely to be successful.

Student-designed games (SDG) is the process in which students create, practice, and refine their own games and in which the teacher acts as a facilitator while providing guidelines and establishing limits to ensure students' safety and positive learning experience (Hastie, 2010). SDG have been identified as a physical education content that has the potential to enhance students' understanding of and respect for individual differences, given that "students will interact positively with others in their class regardless of personal differences (e.g. race, gender, ability, disability, culture, ethnicity, religion) and can recognize similarities and differences between and among people that contribute to cooperative and competitive activities" (Hastie, 2010, p. 13). More recently, Vidoni and André (2017) reported that SDG promote many leadership roles for girls who were more supportive in encouraging a more democratic and motivating environment to all students.

Given the concern for providing an environment with more equity in which students are given the opportunity to relate to their own interests, it is important to gain a better understanding of what gender differences might arise during such a creative process in a physical education class. That is, although SDG seek to empower students' opinions and encourage students to relate to their interests, it would be valuable to learn how gender might affect the creation of games. Hence, this study analyzed gender differences during two SDG interventions. More specifically, the research addressed the

following research objectives: (a) how gender differences may affect students' enjoyment/engagement in SDG units and (b) how gender differences may affect game characteristics in SDG units.

Method

This research was part of a larger study that analyzed different aspects of SDG including teaching methodologies and students' learning and experiences. As the study developed, the gender differences that had arisen in this intervention became overwhelming; hence, further exploration to understand the different interpretations of SDG turned this study toward a case study design. According to Schwandt and Gates (2018), "a case can be designated as specific and developed during the course of the research" (p. 342). Hence, this study followed a descriptive case study design, seeking to portray the different appreciations (engagement and enjoyment) and game designs that each gender experienced while engaging with the same SDG teaching unit.

Procedures: Implementing the Intervention

The SDG unit followed André and Hastie's (2018) five-stage methodology. These were (1) SDG introduction, (2) learning about game design, (3) playing each other's games, (4) games' refinement, and (5) establishing the final game.

The focus of the SDG introduction (Stage 1) was on checking students' previous knowledge and introducing a number of game forms that highlight differences in rules concerning manipulating implements, moving with and without possession, and scoring. In addition, a number of tag games were also introduced. These were mainly focused on locomotor skills and moving into open spaces and hence were less skill demanding by design. Therefore, Stage 1 presented all five games categories (tag, target, net/wall, striking and fielding, and invasion) identified by Hastie (2010), providing the full range of all social games (also known as games with rules) that could be designed. The game design (Stage 2) process involves students learning about the leading questions of invasion games (the chosen category for this project) to design their games. This category was chosen because it provides the most scope for innovation in design

and for the development of games that suit the agendas of the different teams of players. Moreover, although students were first introduced to the leading questions of one category, some groups still chose to create games from other categories (see Tables 3 and 4) and they were still allowed, encouraged, and supported to design their games according to their interests. This stage gave students the guidelines to design their game. For instance, Hastie's (2010) game design leading questions call attention to what needs to be answered for students to avoid pitfalls in game design. Playing each other's games (Stage 3) involved students playing other groups' games and providing feedback to improve that game. Games' refinement (Stage 4) was the process in which the design teams had the option of altering rules and modifying their games to enhance the final version. Establishing the final game (Stage 5) was the process of recording all game details (rules, equipment, boundaries, etc.) in a game playbook.

Participants and Setting

The participants in this study were 82 eighth- and ninth-grade students (34 male, 48 female) from a junior high school in the Southern United States. All participants provided assent to participate and their legal guardians gave informed consent. The study protocol was approved by the university institutional review board for human subjects research.

The SDG intervention consisted of ten 75-min lessons over 5 weeks. Although all lessons were planned and taught by Mauro André, the students' two regular physical education teachers were present during all lessons. These teachers supported André with equipment and class management, supervising students' activities, and providing game instructions in the early lessons when students were participating in teacher-designed games. Both teachers were highly interested from the commencement of the project, constantly asking questions about upcoming activities or about the findings discovered up to that point.

The study was introduced to two groups of students (from the same school) that were taught on different days of the week. In total, the students became members of 17 construction teams that remained together throughout the project. Each of the two groups

could select its own members, provided one rule was followed. That is, each group must consist of between three and five members. Group 1 was formed by 31 students (12 male, 19 female) and had 7 groups (all single-sex). Group 2 was formed by 51 students (22 male, 29 female) and had 10 groups (2 coeducational, 8 single-sex). For the most part, students chose to remain in single-sex groups.

Data Collection and Analysis

The research utilized three methods of data collection. These were field note observations, focus group interviews, and surveys.

During all lessons, André used a portable voice recorder to make field note observations, describing, analyzing, and including students' quotes while observing students' actions. Regarding the first research objective (students' engagement and enjoyment), reporting students' reactions during each activity made it possible to better understand which activities students liked or disliked and to judge their commitment in the process of designing their games. Regarding the second research objective (designed-games characteristics), reporting students' discussions during each lesson and during their game design in particular made it possible to better understand what kind of characteristics students were seeking when designing their games.

At the completion of the intervention, focus group interviews were conducted with each of the 17 construction teams. The questions were developed according to key issues developed within the field note observations. Therefore, the interviews were used for two purposes: (1) to double-check what was reported in previous data collection and (2) to seek for further explanations on why and how students experienced their intervention. Regarding the first research objective (students' engagement and enjoyment), the purpose of the interviews was to find which factors enhanced or inhibited the students' experiences of the SDG teaching unit. Regarding the second research objective (designed games characteristics), students were encouraged to explain the reasons behind their game design. That is, the key task was to determine what features the students were trying to promote for those who would play their games (e.g., participation, challenge). Table 1 presents the full interview script.

Table 1
Interview Script

Section		Questions
Introduction	1	Did you like the SDG unit?
		What did you like or dislike in particular?
	2	Was this the first time that you had SDG in PE?
	3	What made you choose this group?
		Do you think you would enjoy as much with a group delegated by the teacher?
		Would you like to work with boys/girls [different gender]? Why?
Students enjoyment & engagement	In our class, we had 5 stages:	
	SDG introduction	
	Learning about game design	
	Playing each other's games	
	Games' refinement	
	Establishing the final game	
	4	Did you have a favorite moment and something that you did not like about it?
	5	Is there something in this class that you wish we would not do? (considering SDG unit)
	6	Is there something in this class that we did not do, but you wish that we did? (considering SDG unit)
	7	Do you consider your engagement in this class the same as in other PE classes, higher or lower? (If any changes) what made it different?
	8	Did you mind to stop playing to focus on the game design?
	9	Did you work outside of PE for this class? If so, how much?
	10	Did you see a purpose of this class?
	11	What did you learn with it?

Table 1 (cont.)

Section	Questions	
Game design characteristics	12	We have a list of the SDG that you played. Which one was your favorite and why?
	13	What did you learn while designing your game?
		How many times did you change?
		Did you come up with more than one game?
		What did you learn about the rules you introduced—how they fit your game/idea?
	14	What was your goal when designing your game?
		Novelty (new)
		Challenge
		Exploration/intention
		Instant enjoyment
	16	Did you notice anything different in games designed by boys/girls?
	17	Did you find the games that the boys/girls designed more/less fun or the same? Why?
	18	When proposing new rules on your own game or others, what were you trying to do?
		Turn the game more strategic
		Make the game easier for me to play/win
		Include everyone in the game
	19	If someone could not play my game, it was:
		My fault…
		Their fault…

Note. SDG = student-designed games.

The data analysis used protocols proposed by Lincoln and Guba (1985) and Denzin and Lincoln (1994) in which a systematic process of inductive analysis and comparison of methods is performed with both sources of data. First, the field notes observations were analyzed and the first interpretations delineated. Second, these analyses

were compared with all interview transcripts. When accumulative data confirmed the same concept, themes were generated.

On the last day of the intervention, each group took a five-question survey about the SDG unit. The survey was anonymous, ensuring that students felt comfortable reporting any dissatisfaction with the SDG unit. As such, the questions related only to the first research objective (students' engagement and enjoyment). Table 2 shows the survey. The analysis of the survey followed a one-way analysis of variance (ANOVA) to evaluate for statistical differences between male students and female students.

Triangulation and use of an ethnographer observer ensured trustworthiness of the data. Triangulation is the process in which a researcher uses multiple methods to analyze the same research question, which provides a more holistic perspective and reduces the likelihood of misinterpretation (Stake, 2002). Overall, this study used three methods, although the survey method was only used to address the first research objective. Therefore, the data collected with one method was either reevaluated with another method (to guarantee research rigor) or further explanation was drawn because each method provided complementary information regarding the subject matter being analyzed. The ethnographic observer is the process in which another researcher who is to be considered an expert on the studied subject matter takes a supporting role to ensure the proper delivery of the proposed theoretical framework (Hastie & Buchanan, 2000). Peter Hastie (second author) undertook the ethnographic observer role while attending many lessons and having several meetings to discuss the intervention pedagogy, which ensured consistency and model fidelity. Hastie also undertook fieldnote observations, as a member check when Mauro André (first author) was drawing analysis of students' actions.

Results

The results reported the gender differences during the SDG unit while considering their (a) enjoyment and engagement and their (b) games characteristics.

Three themes were reported while considering the disparities of boys' and girls' enjoyment and engagement in the SDG unit. These include Theme 1: girls reported higher levels of appreciation for the SDG unit; Theme 2: both genders appreciated their choice of group

members; and Theme 3: girls found it particularly important to play with other girls.

Although both boys and girls showed positive responses to SDG in all five questions, the mean scores for girls were higher for all five items, with two questions (Q2 and Q3) showing significant differences. In essence, girls more than boys suggested they would like to have more SDG experience and considered their enjoyment in SDG units higher than their enjoyment in other PE classes (Theme 1). Table 2 shows the scores for girls and boys by question.

Analysis of the field notes and focus group interviews showed that students of both genders enjoyed being able to work within self-selected teams. The girls, however, seemed to value this more than boys did.

In other PE classes, besides having control of the activity that was being developed, the teacher would also designate which group of students would work together. In the SDG units, students had the liberty to choose their group members, with whom they would not only work together to design their game but also play together. The great majority of students believed that they would not enjoy designing their own games if they could not choose their group members. The majority of students also expressed a concern at not being able to show their own personality or share their opinion while working with peers who were not their friends. One eighth-grade girl illustrated this point of view, stating, "I know I can be bossy, so if I am bossy, [my group members] will tell me to stop being bossy and other people may be shy to tell me to stop being bossy" (interview).

When discussing group membership, many students mentioned gender differences. Most boys and girls expressed that they did not consider themselves as being able to work well with the opposite sex (Theme 2). All students worked with both types of groups (single sex and co-ed) while participating in Stage 3 (playing each other's games and giving feedback). Boys expressed concern about working with girls, saying they believed that girls' ideas about games were different from their own. One eighth-grade boy illustrated this point and said, "Well, boys are more dominant [higher skill level] and girls' games taught little to no skill . . . and girls have very different opinions on things . . . and if you need to cooperate, it would be hard to do with different opinions" (interview).

Table 2
Comparison of Students' Overall Experience by Question and Gender

Question	Girls *M* (*SD*)	Boys *M* (*SD*)	*F*
Q1: How would you rate your overall enjoyment in the SDG teaching unit? (Rating 1–10)	7.11 (2.40)	6.5 (2.21)	0.88
Q2: Would you like to have more creating games experiences in PE classes? (Rating 1–4: *no way*; *probably not*; *most likely*; and *yes, definitely*)	3.15 (0.76)	2.59 (0.89)	7.09*
Q3: Comparing to other PE lessons in general, do you consider creating games in PE (enjoyment) (Rating 1-5: Much worse, Worse, The same, Better, Much Better)	3.91 (0.94)	3.21 (1.12)	9.42*
Q4: Looking at your overall experience in creating games, do you think that your participation was (Rating 1–5: *very low*, *low*, *ok*, *high*, *very high*)	3.82 (0.85)	3.76 (0.85)	0.06
Q5: Comparing to other PE lessons in general, do you consider your participation in creating games (Rating1–5: *much worse*, *worse*, *the same*, *better*, *much better*)	3.91 (0.96)	3.74 (1.05)	0.11

Note. SDG = student-designed games.

* $p < .01$.

Girls also echoed the inability to work cooperatively sentiment when they stated they believed that boys would not work cooperatively with them. In this case, an eighth-grade girl noted, "Boys just say random things and we would have to write everything" (interview). Two groups of girls said that they would like to work with boys, but once again, they showed the same concern. An eighth-grade girl illustrated this scenario: "I think it would be fun to work

with boys because they have different perspectives . . . but it would be fun if they would actually put in the work, because some of the guys are just like 'I don't care'" (interview).

The appreciation of playing the games with your own group members was also noted, especially by girls (Theme 3). One ninth-grade girl pointed out the importance of playing with girls on your team: "[The boys] are all mean; they 'hog' the ball and don't let you contribute" (interview). Girls often complained that boys would mistreat them for missing a play and/ or losing possession of the ball, whereas girls would not mind if they were not good and would even ensure that everyone got to participate in the game (field notes).

Boys, on the other hand, were more concerned with having a balanced game when playing and were less concerned about whether they were playing with their group members or with those from other groups. In fact, one boys group stated that they changed players a few times with other groups to ensure that the game was "even" (at a similar skill level; field notes).

For the gender impact of students' game characteristics, it is important to remember that both SDG units were formed by 17 design groups altogether, 15 of those groups were single sex (9 female, 6 male) and 2 were coed. The comparison of game characteristics focuses exclusively on single-sex groups. It can be claimed that the girls created more ludic games, whereas boys created more strategic and challenging games.

Table 3 provides a summary of the games created by each female group and Table 4 provides a summary of the games created by each male group. These tables provide a reference point for the discussion of the comparison of elements of game design between genders.

The most declarative statement about boys' and girls' games is the significantly different purposes. According to one ninth-grade boy, "Girls have a different opinion about games . . . it is like that bouncing ball game [balloon ball], it is a very simple game, it is like a game of keep up [keeping a balloon without touching the ground]" (interview). Another eighth-grade boy expressed a similar perception: "All girls' games were kind of capture the flag, it was less skill and more luck" (interview). Boys from both groups identified that girls' games were more playful and less strategic. One boy mentioned, 3 out of the 9 games designed by girls had components related to capture

the flag, a game played by younger children. In addition, the games designed by girls were seen to present "less challenging skills." As Table 3 shows, most of the girls' games focused on locomotor skills (e.g., running and dodging) or manipulative skills that were less demanding (e.g., catching a beanbag and volleying a kin-ball).

Table 3
Game Summaries From Female Groups

Name of the game	Games details
Wall Ball Mix	**Concept:** Variation of wall ball (net/wall game)
	Setting: Half indoor court with a wall. Designate 1 goal area for each team (each goal area is next to each other on the same wall). Play with 2 teams of 5 players. Use a tennis ball.
	Scoring: 1 point for catching the ball after throwing at the wall
	Progression: Every player must receive the ball before throwing to score.
Balloon Ball	**Concept:** Create an invasion game using a kin-ball (invasion game)
	Setting: Regular basketball court, using the basketball keys as end zones. Play with 2 teams of 4–5 players. Use a kin-ball (35' radius).
	Scoring: 1 point for catching the ball inside either of the end zones
	Progression: Volleying and passing
Bags to Mats	**Concept:** Game uses beanbags for easy throwing and catching (invasion game)
	Setting: Indoor court with walls and no boundaries. 1 designated area (mat on the wall) at each end of the court. Play with 2 teams of 5–10 players. Use a beanbag.
	Scoring: 1 point for throwing the beanbag at the mat and 2 points for touching the beanbag to the mat while holding it
	Progression: Running and passing

Table 3 (cont.)

Name of the game	Games details
Hogball	**Concept:** Soccer played with a "horizontal" net (wide baseline, ball must cross all of it; invasion game) **Setting:** Indoor court with walls and no boundaries. Play with 2 teams of 5 players. Use volleyball. **Scoring:** 1 point for scoring in the soccer net **Progression:** Dribbling and passing
2-Person Kickball	**Concept:** Variation of kickball (striking & fielding game) **Setting:** 7 bases spread in a rectangle format inside an indoor court. Play with 2 teams of 8–10 players. Use dodgeball. **Scoring:** Run seven bases to score a point **Progression:** All kickers must have a partner. When kickers run, they must be holding hands with their partner.
Catch the Frozen Kin	**Concept:** Tag game with a prison. Use a kin-ball to tag players (tag game). **Setting:** Use an indoor court. Set a jail that takes one third of the court space. Play with 3 teams of 3–7 players. **Scoring:** 2 teams are runners and 1 team is a tagger. The tagging team must put an entire team in jail in less than 5 minutes to score 1 point. **Progression:** Tagging team must use the kin-ball to tag runners. One of the taggers may tag without the kin-ball to be able to protect the jail (runners may save their teammates by tagging them back).
Flag War	**Concept:** Mixture of capture the flag and dodgeball (hybrid tag-invasion game) **Setting:** Use an indoor court. Place a flag on both ends of the court and place 5–10 balls at the center of the court. Play with two teams of 10–20 players. Use soft dodgeballs. **Scoring:** Recuperating the flag from opponent team's court wins the game. **Progression:** Running—when on the opponent's court capture the flag (may be tagged and must go to jail). Throwing—players from your team may throw grenades (balls) to eliminate opponents on their court.

Table 3 (cont.)

Name of the game	Games details
Noodle	**Concept:** Capture the flag with multiple flags (hybrid tag-invasion game) **Setting:** Use an indoor court. Divide the court in half and place 8 Hula-Hoops with 8 different objects inside (cones and different balls). Play with 2 teams of 5–6 players. **Scoring:** Recuperate the most number of objects in 5 minutes (or recuperate before 5 minutes) **Progression:** Running and tagging
Dodge, Shoot, and Capture	**Concept:** Capture the flag variation (hybrid tag-invasion game) **Setting:** Divide the basketball court in two. Each end of the court should have a flag on one side and a Hula-Hoop with a basketball on the other side. Play with 2 teams of 5–7 players. **Scoring:** Recuperating the flag from opponent team's court wins the game. When tagged, player must go to jail (Hula-Hoop with basketball—may have a "jail break" when player makes a basket). **Progression:** Running and tagging

Table 4

Game Summaries From Male Groups

Name of the game	Games details
Ultimate Basketball	**Concept:** Mix of basketball and football. Played with a basketball, but player had to get to an end zone to shoot the basket (invasion game). **Setting:** Regular basketball court with end zones starting at the free throw line. Play with 2 teams of 4 players. Use a basketball. **Scoring:** Put basketball in regular basketball hoop **Progression:** Regular basketball dribbling throughout the court. No dribbling in end zone (just passing).

Table 4 (cont.)

Name of the game	Games details
Streetball	**Concept:** Adaptation of football played in a basketball court (invasion game) **Setting:** Regular basketball court, using the basketball keys as end zones. Play with 2 teams of 5–6 players. Use a football. **Scoring:** 6 points for a touchdown. Extra points: basket from the free throw (1 point) or basket from the 3-point line (2 points). **Progression:** 4 downs to get to the end zone: running and passing
Tinezz	**Concept:** Variation of speedball (game that uses both hands and feet to progress with the ball; invasion game) **Setting:** Indoor court with walls and no boundaries. 1 soccer goal at each end of the court. Play with 2 teams of 5+ players. Use a dodge ball. **Scoring:** 1 point for passing the ball to a teammate in the center circle after 3 passes or 1 point for kicking the ball in the goal. **Progression:** Dribbling with the feet or passing the ball using the hands
Hoopball	**Concept:** Mix of basketball and football. Player had to get to an end zone to shoot the basket (invasion game). **Setting:** Regular basketball court with 9 ft 2 in. end zones. Play with 2 teams of 5–6 players. Use a foam ball. **Scoring:** 1 point for getting the ball in the basket **Progression:** Running and passing (no dribbling). Players loses possession if tagged with two hands.
Ground Quidditch	**Concept:** Used a goal similar to Quidditch (Harry Potter's game) by hanging a Hula-Hoop from the basketball hoop. Goalkeeper with a bat would protect the goal (invasion game). **Setting:** Indoor court with one goal box of 5 ft 2 in. Play with 2 teams of 4–6 players. Use a foam ball and one bat for each keeper. **Scoring:** 1 point for getting the ball in the goal **Progression:** Passing only

Table 4 (cont.)

Name of the game	Games details
The Game	**Concept:** Knock down cones from the other team's territory. When a cone is hit, a player is eliminated (target game). **Setting:** Indoor court with 6 cones on each side. Play with 2 teams of 6 players. Use 6 dodgeballs. **Scoring:** Team that eliminates all other opponents wins **Progression:** Throw the ball to hit the cones

At the same time, girls were critical of boys' games. According to one ninth-grade girl, boys have a different perception about game play: "They act like this is the Olympics, so if you mess up, they freak out . . . and then it is the end of the world." An eighth-grade girl described the boys' games as being "more sporty," noting that boys' games were more "physical" (suggesting they were more aggressive). When creating their games, boys focused on the promotion of competition and each player's dexterity in performing a specific task (field notes).

As Table 5 shows, boys tended to modify their games to make them more strategic, whereas girls showed more concern toward including everyone in the game. Two examples support this contention. In the first case, the group of girls who created Wall Ball Mix included a rule that every player from the offensive team had to touch the ball before they would score. Equally, the group of boys who created Ground Quidditch modified the goalkeeper's box to establish a balance between offense and defense (to make the scoring goal not too easy or not too hard). Therefore, boys sought to design games that involved a higher skill level and were more strategic, as they enjoyed the competition component of games, whereas girls sought to design games that were easier to play and/or that would ensure everyone's participation to promote a more ludic and inclusive atmosphere while playing.

Table 5
Boys and Girls Groups' Response to Game Design During Focus-Group Interviews

Answers	Boys groups' response	Girls groups' response
When proposing new rules on your own game or others, what were you trying to do?		
Turn the game more strategic	4	1
Make the game easier for me to play or win	1	3
Include everyone in the game	1	5
If someone could not play my game, it was . . .		
My fault (as a presenter/game designer)	2	5
Their fault	4	2
Undecided/unsure	0	2

Note. There were 15 single-sex groups (6 boys groups, 9 girls groups). Each answer represents what the group decided to answer as a collective.

Discussion

Although the mention of SDG first appeared in the late 1960s by Mauldon and Redfern (1969), there is still little empirical research in this area. Despite the overwhelming literature of gender issues related to PE, little research has focused on gender issues in SDG. Like so many areas in physical education, gender differences play an important role in SDG in both areas that were researched (enjoyment/engagement and game designs) in this study.

Girls reported an interest in experiencing future opportunities to design their own games, which suggests this exposure was preferable to their traditional physical education classes. These findings are consistent with those in the extensive literature reporting that when PE curricula privilege aggressive male students who can dominate team sports activities, girls' participation is compromised (Cockburn & Clarke, 2002; Couturier et al., 2007; Ennis, 1996, 2011). In these classes, girls can be refused to have any form of empowerment (not only physically but also in terms of being able to give their opinion); therefore, they are constantly restrained from participation,

becoming marginalized. SDG create an equity that transcends gender and skill level differences, because students are empowered to create a game that relates to their preferences. Therefore, it is natural that girls enjoy this gain of power in PE, because they can express their opinion and even propose a game that they would like to play.

Although boys showed more concern with promoting competition, and therefore focused on strategic games that encouraged the performance of high levels of particular skills, this competition was not counterproductive to girls' participation. On the other hand, girls showed more concern with designing games that would optimize all players' participation, creating a ludic atmosphere that would not require much skill to play; hence, all participants could take part with higher chances of success.

Of interest, boys and girls had different responses to changing their games. Girls showed greater willingness to change their own game (or make suggestions to other games), focusing on everyone's participation. Boys tried to change their games to make them more strategic. Moreover, girls blamed themselves if other students could not play their game, whereas boys blamed other students. These findings seem to be consistent with those of Hastie and André (2012), who reported that girls were more likely than boys to change their games to accommodate other students' needs.

These differences in reactions may be reflective of the students' previous PE experiences. Although popular American sports such as basketball and football are constantly part of PE classes and may play an important role to keep boys motivated, they may also marginalize girls' participation. Azzarito (2011) called attention to the gendered hidden curriculum that shapes the contexts of schools, praising activities that historically have been predominated by boys and excluded girls. Therefore, the girls' concern for including every student in the game and even avoiding skills that are harder to perform may be a reaction to previous unpleasant experiences that problematized their own participation.

The research confirms previous findings concerning gender differences in SDG. Further research focusing on gender differences in SDG may support teachers on how to approach each gender and enhance their SDG experience.

Although this study provides important insights about gender differences in appreciation, interests, and outcomes in an SDG unit, this study has some limitations in design. First, although some important factors may be analyzed for boys and girls in single-gender groups, the gender literature presents the concept of intersectional analysis (Watson, 2018), acknowledging that neither girls nor boys should be portrayed as a group simply defined by gender alone. The intersectional analysis includes gender, sexuality, race, socioeconomic status, cultural background, and faith. When interacting, all of these characteristics may play different roles on how boys and girls perceive each experience. Although looking at gender differences alone may provide important insights to teachers, simple generalizations should not be drawn. Second, although the majority of students appreciated the freedom of choosing group members, this freedom may have also reiterated gender differences rather than promoting an environment that cultivates a constant conversation that would need more compromises. In other words, when students seek to work with other students with whom they feel more comfortable, this may enhance their differences rather than allow them to learn to work with all students.

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PEDAGOGY

Supervisor Feedback: Perceptions From Physical Education Teacher Candidates

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Abstract

This study investigated physical education teacher candidate perceptions on feedback received from cooperating teachers and university supervisors during their student teaching experience. We used a basic qualitative research design (Merriam, 2009) to determine the perceptions of five teacher candidates from a public university in Puerto Rico. Teacher candidates completed daily reflections, weekly descriptive questionnaires, and in-depth interviews, which we used as sources of data. Three themes emerged from collected data: quality of supervision, feedback and evaluation, and satisfaction with relationship. Of particular interest, the teacher candidates in this study perceived cooperating teachers as not offering the needed feedback to improve their teaching performance in the classroom. Conversely, teacher candidates perceived the feedback from their university supervisors as helpful in developing and improving their teaching skills. Although the participants in this study acknowledged both their cooperating teachers and their university supervisors as mentors, the results indicate that the type of feedback received from each may be perceived as beneficial,

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neutral, and at times negative toward the student teaching experience. Recommendations for cooperating teachers, university supervisors, and student teachers will be discussed with the purpose to improve the physical education teacher preparation process.

The relationships between university supervisors, cooperating teachers, and teacher candidates are complex and unique with each potentially bringing different expectations, teaching philosophies, and methods to the student teaching practicum experience (Caplow, 1968; Gervais & Desrosiers, 2005; Knowles et al., 1994). With the development of content area knowledge, the completion of teacher education program of study courses, and the fulfillment of required field experience hours, teacher candidates next find themselves paired with cooperating teachers and university supervisors to begin their student teaching practicum experience (Cuenca, 2010; Lawson et al., 2015). The relationships within and between these three individuals have been referred to as the student teacher triad (Yee, 1967). With student teachers spending close to 400 hr with their cooperating teachers (Becker et al., 2019; Veal & Rikard, 1998), collaboration and reflective dialogue, based on mutual trust, must be established to enhance the quality of the experience (Beck & Kosnik, 2002; Hobson et al., 2009; Hudson, 2016; Gwyn-Paquette & Tochon, 2001). Teacher candidates must also manage relationships and build trust with their university supervisors, although these relationships are not as intensive in terms of contact hours.

These collaborative and mutually trusting relationships benefit the teacher candidates by improving confidence and comfort in their ability to receive and use the needed feedback (Goodnough et al., 2009). This feedback, when timely, accurate, and consistent, is generally known as one of the more effective strategies for teacher candidates to improve their performance as classroom teachers (Randall, 1992; Scheeler et al., 2004). For example, appropriate and accurate feedback may serve as a stimulus to help promote teacher candidates' critical thinking skills (King, 2008). With this, the use of verbal and written feedback is regarded as an effective strategy for promoting reflective activity (Crotty & Allyn, 2001; Hatton & Smith, 1994; Napper-Owen & McCallister, 2005; Schon, 1987). Additionally, the provision of this formal feedback has been found to motivate

teacher candidates to continue professional progress and development when they become certified teachers (D. Wilson, 2002).

However, when the feedback is perceived as inappropriate or inaccurate, the teacher candidate may form negative opinions about their progress within the practicum experience. To address potential misinterpretations of feedback, teacher candidates can adopt a receptive attitude when asking for assistance from their supervisors and when seeking clarity of supervisors' comments. This receptiveness will help student teachers clarify perceptions, learn from the feedback given, and subsequently put appropriate teaching strategies into practice (Siedentop & Tannehill, 2002).

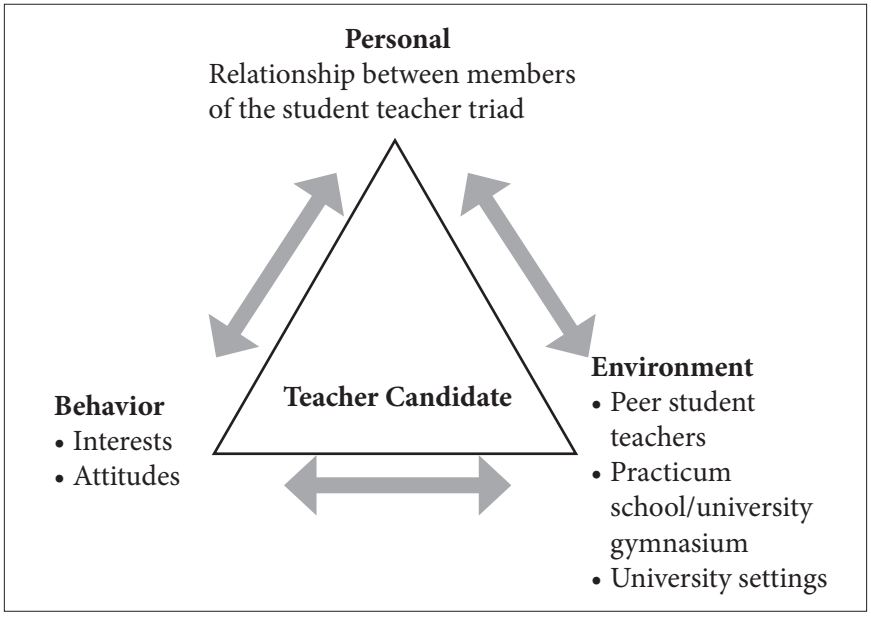
Even with the best preparation and planning, from a practical perspective there is no one magic formula to guarantee a successful experience during the student teaching practicum experience (Knowles et al., 1994). However, it is clear that the provision of adequate feedback encourages teacher candidates to be reflective thinkers (King, 2008). With this in mind, when teacher candidates receive constructive and systematic feedback, they are in a much better position to implement positive adjustments both in their own reflective teaching practice and in future classroom teaching episodes (Greenwood & Maheady, 1997).

It has been well documented within teacher preparation programs that one of the most significant, demanding, and stressful experiences is the practicum phase (Ali & Khalid, 2015; Caires et al., 2012; Widden et al., 1998; S. Wilson et al., 2001). During these student teaching experiences, teacher candidates have the opportunity to gain personal practical knowledge about the profession and the daily work of teaching (Cuenca, 2010; Gu & Benson, 2015). Furthermore, with supervision and mentoring by experienced professionals, teacher candidates can develop and refine their critical teaching skills (e.g., behavioral and time management; Ali & Khalid, 2015; Gurvitch & Metzler, 2009; Johnson & Napper-Owen, 2011). Through attentive observation, reflective listening, and thoughtful guidance, cooperating teachers and university supervisors can best facilitate a clearer understanding of the work of in-service teachers (Cuenca, 2010; Vogt, 1988).

In examining the dynamic relationships within this student teacher triad, it is important that we acknowledge the influence of social

learning theory (Bandura, 1986) on teacher candidates' perceptions of feedback from their supervisors. Utilizing the triadic reciprocal causation model, Bandura (1986) observed human actions as a result of an interaction among *personal, environmental, and behavior factors*. When the triadic reciprocal model for human behavior is applied to the student teacher triad, teacher candidates' perceptions of their supervisors' feedback could be influenced by all three of these factors (Figure 1). With this theoretical framework in mind, teacher candidates may change perceptions of supervisors' feedback while moving through the practicum experience. Interactions with fellow students and staff from the practicum school and university (*environment*), the relationship that teacher candidates experience with their supervisors (*personal factors*), and the interests that teacher candidates have toward the profession of teaching (*behavioral factors*) may affect their perception of feedback. As evident in Figure 1, these factors can occur in any order or direction. This qualitative research study was designed to uncover and understand teacher candidates' perceptions of feedback from practicum supervisors.

Figure 1
Application of the Student Teacher Reciprocal Learning Model From Bandura (1986) to This Study



Method

This study followed a basic qualitative research design. Merriam (2009) presented basic qualitative research as an interest in how an individual constructs reality while interacting with social factors (Merriam, 2009). Thus, this study investigated physical education teacher candidates' perceptions of feedback from cooperating teachers and university supervisors during their student teaching experience.

Participants and Setting

Participants were undergraduate students who had completed all required physical education teacher preparation coursework and were participating in their student teaching experience as the final requirement before licensure at the time of this study. Five teacher candidates (3 females, 2 males) ranging from 23 to 30 years of age participated in this study. They were enrolled in a student teaching practicum course in the Physical Education and Teacher Education (PETE) program of a public university in Puerto Rico. Each teacher candidate completed 13 weeks of practicum at a middle and high school site.

All cooperating teachers were certified teachers, had at least 3 years of experience teaching physical education, and had obtained a cooperating teacher certification as established by the Department of Education of Puerto Rico. Research in the field has examined the experiences of teacher candidates regarding the different relationships that support teacher candidates (Coker, 2017). Such relationships could be colored by the personal perspectives of teacher candidates. This study explored teacher candidates' perceived feedback received within the learning relationships inherent within the student teacher triad.

Data Collection

Qualitative interview was the primary source of data collection (Rubin & Rubin, 1995). May (2002) suggested interviews need to guide participants through a maze of life experiences. The interview consisted of questions regarding the feedback provided by the cooperating teacher and the university supervisor. Interviews were performed right after a teaching episode was evaluated by the

cooperating teacher or the university supervisor. All interviews were conducted at a convenient location for the teacher candidate and lasted between 20 and 30 min.

To obtain more information about the experience of the teacher candidates during the practicum experience, we employed daily reflections and questionnaires as a secondary source of data collection. Each candidate kept a daily reflection log throughout the 13 weeks of their practicum experience. Guidelines for the content to be included in each reflection were outlined by the student teacher program coordinator as part of the practicum course. Regarding the questionnaires, after each teaching episode evaluated by the cooperating teacher or the university supervisor, teacher candidates completed three questions about the quality of supervision. In general, teacher candidates were encouraged to write about their feelings and experiences during the practicum.

The data collection protocols were pilot tested with three teacher candidates the semester before the study was performed. On the basis of the pilot study, appropriateness of questions, language, length of questions, and clarity were revised by a panel of experts. All sources of data collection and procedures were approved by the institutional review board. All participants signed informed consent forms prior to the first day of practicum.

Procedures

The participants were provided with instructions on how to complete the questionnaires and daily reflections. After each evaluation from the cooperating teachers or the university supervisors, the teacher candidates completed a questionnaire developed for the purpose of the study and then were interviewed at the earliest convenient time. Interviews were conducted three to four times during 13 weeks. Interviews were audio-recording and conducted three to four times within 13 weeks. Transcriptions of interviews were emailed to participants for member checking. Teacher candidates were also required to submit daily reflections by email at the end of each school day. Data were collected and analyzed after each evaluation.

Data Analyses

Open, axial, and selective coding were utilized in the analysis and interpretation of interviews, daily reflections, and questionnaire data

(Neuman, 1991). During open coding, after the collected data were read through several times, labels summarizing the content were created. After this, relationships among open codes were identified and items were condensed into categories. Last, categories were condensed into themes: quality of supervision, feedback and evaluation, and satisfaction with relationship.

Results and Discussion

This study used a basic qualitative research design (Merriam, 2009) to investigate the meaning and understanding of the perceptions of physical education teacher candidates regarding feedback received from cooperating teachers and university supervisors. Throughout the semistructured interviews, daily reflections, and questionnaires, teacher candidates provided insights based on personal experience with practicum supervisors. The following categories emerged from the analysis: (a) quality of supervision, (b) feedback and evaluation, and (c) satisfaction with relationship.

Quality of Supervision

The quality of supervision theme was operationally defined as the overall perception held by teacher candidates about how well supervisors performed duties associated with supervision during the practicum experience. Teacher candidates had differences in opinion regarding the quality of supervision between each supervisor. They used phrases such as "very helpful" and "excellent performance" were used to describe supervision from university supervisors. Four out of five teacher candidates used the phrase "excellent supervisor." On the other hand, supervision by the cooperating teacher was more commonly recounted as "poor performance," "neutral," "doesn't work," and "they did not perform the job as cooperating teacher." Highlighting this, one teacher candidate explained how his cooperating teacher was working on other school responsibilities during his lesson:

> Sincerely, he is not a good cooperating teacher. He is never in the classroom or gym, he only observed me a few times. However, when he observed me he provided valuable feedback, but what is the importance of the feedback? He

only gives me feedback once a month and is not present to see me growing as a teacher.

Interestingly, the feedback from this supervisor, although very intermittent, was still perceived as valuable. Two additional teacher candidates shared similar experiences regarding the less-than-expected amount of time the cooperating teacher spent observing their lessons: "They can go five to seven days without receiving feedback. It would be beneficial if the cooperating teacher could spend more time with me." These perceived experiences are concerning given that Becker et al. (2019) found that cooperating teachers have the most interaction with and potential influence on teacher candidates during the practicum. Similarly, Veal and Rikard (1998) found that cooperating teachers spend approximately 400 hr with teacher candidates during practicum compared with only 20 hr with university supervisors. In this study, teacher candidates did not perceive themselves to be receiving the quantity or quality of mentorship that may be required to fully enhance their development as future physical educators.

Indicatively, three teacher candidates commented that feedback from cooperating teachers was ineffective because no specific information was provided, nor did the feedback highlight areas for improvement. One teacher candidate responded, "I didn't feel like I did well, because I would like him to at least say, 'you did well' or not, but the cooperating teacher didn't say anything." In addition, another cooperating teacher did not offer daily feedback, with the teacher candidate, stating, "No, I haven't received any feedback at this time." These results somewhat contradict those in Ali and Khalid (2015), who found that cooperating teachers were significantly more helpful for teacher candidates in planning lessons and during the instruction than were the university supervisors.

This study found that university supervisor performance was helpful for teacher candidate development. A teacher candidate acknowledged,

> University supervisor performance is very good, she supports me and helps me with new teaching ideas. She explained with details the areas that I have to improve to be a better teacher. If I ask something, she explained with patience.

The teacher candidate perceived that the feedback received from the university supervisor was effective even though a limited number of observations were provided. Though teacher candidates were pleased with the feedback received from university supervisors, they reported that more feedback would be helpful in supporting their development.

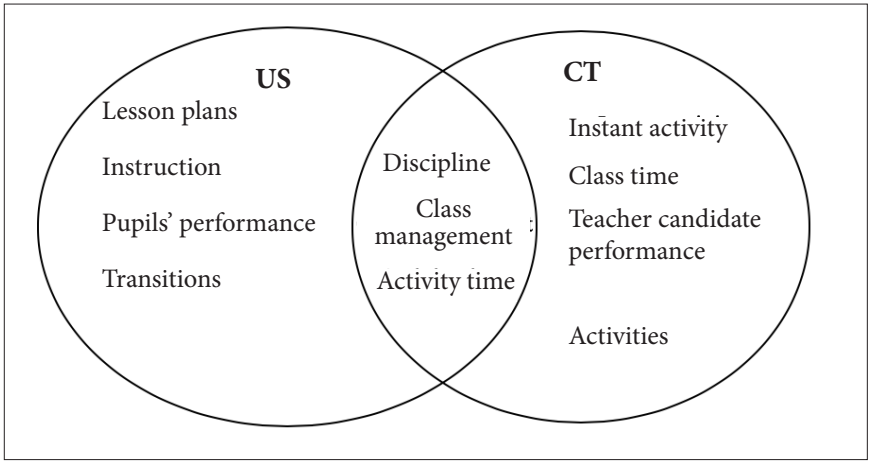
Feedback from both mentors could be beneficial or detrimental for the student teaching experience. A collaboration between supervisors and equality of task should exist during the student teaching experience. For example, cooperating teachers suggest that university supervisors spend more time observing in the schools to better understand the challenges that teacher candidates face during practicum (Veal & Rikard, 1998). The most valued features that teacher candidates can receive from their supervisors are interaction, relationship, respect, and support—ideally with both mentors helping teacher candidates mature and develop their teaching skills (Ediger, 2009).

Feedback and Evaluation

Feedback is an integral part of the quality of supervision perceived by the participants in this study. Feedback here is the written and verbal information teacher candidates received from cooperating teachers and university supervisors in regard to their performance in the practicum experience. Feedback can be perceived as positive, negative, or neutral information regarding the performance of the teacher candidate. However, the provision of adequate feedback promotes the development of reflective teaching in the teacher candidate (King, 2008). The five teacher candidates constantly reflected on areas of teaching in which supervisors provided feedback (Figure 2). Both supervisors provided feedback on a variety of teaching skills. The three areas of teaching that both supervisors focused on were classroom management, discipline, and activity learning time. For example, a teacher candidate stated,

> The feedback is always based on classroom management. I have a hard group, and they are in the transition from elementary to middle school. They are adapting; therefore, I don't have good classroom management.

Figure 2
Areas of Teaching That the University Supervisor (US) and Cooperating Teacher (CT) Focused on When Offering Feedback to the Teacher Candidate



When evaluated in general terms, discipline is a major area of concern for cooperating teachers and university supervisors. Managing disruptive student behavior continues to be a major area of concern in public education (Page et al., 1987) with management of undesirable behaviors being integral to the development of a positive learning environment (Graham et al., 2013).

Two teacher candidates in particular commented that the feedback from their cooperating teacher was effective but limited. One of the two explained, "On occasion, the majority of the feedback provided by my cooperating teacher is too general." These findings are congruent with those in studies that found the quality and quantity of feedback provided from cooperating teachers may at times be limited and lacking specificity (Freiberg & Waxman, 1988; McIntyre & Killian, 1987; Richardson-Koehler, 1988; Tannehill & Zakrajsek, 1988; Veal & Rikard, 1998; Wilkins-Canter, 1997). Conversely, another candidate positively commented on his cooperating teacher being "very specific while providing feedback…it was immediate."

When asked about areas of feedback that cooperating teachers focused on in their feedback, teacher candidates noted instant activities, classroom management, and active learning time. One teacher candidate stated, "My cooperating teacher focused on the beginning [of the lesson] and development of the lesson, classroom

management, time on task, time of the lesson, and my performance as a teacher." These results are consistent with those in studies that indicated classroom management is a teaching area that cooperating teachers feel teacher candidates need to improve (Al-Bataineh, 2009; Imbibo & Silvernail, 1999).

Effective feedback provides teacher candidates support and direction on teaching performance (Wilhelm, 2011). Teacher candidates in this study perceived feedback from university supervisors was most effective because it assisted them in improving teaching performance, provided them suggestions for fine-tuning classroom management, and enhanced their teaching methods. One teacher candidate stated,

> The feedback provided is effective because it helps me to be a better teacher and see areas that I can't see while I am teaching. The university supervisor observes my mistakes. That way I can fix them, and keep doing what I am doing well.

University supervisors also helped teacher candidates become more aware of details that may not have been at the forefront of their consciousness while teaching lessons. A candidate explained,

> The university supervisor told me that I have to include more activities in my lessons, modify the tasks, and be more creative at the time of designing the activities. She provided me with websites to look for innovative activities and she also suggested to talk with a former student teacher to gather new ideas.

These results are consistent with those in studies that found feedback provided by a mentor to be effective when it is frequent, specific, and relevant to the specific needs of the teacher candidate (Acheson & Gall, 1992; Barnes & Edwards, 1984; Blank & Heathington, 1987; Morehead et al., 1988; Woolever, 1985).

One of the many responsibilities of practicum supervisors is to produce the final evaluation that a teacher candidate brings with them to their first professional assignment (Mozen, 2005). To assess and facilitate the learning process of the teacher candidate during practicum, all practicum supervisors connected to this study

employed evaluation methods. The methods used by the cooperating teacher and the university supervisor included a rubric provided by the institution and observation notes. A teacher candidate described evaluation by the university supervisor:

> The objective method that my university supervisor used to evaluate me was a rubric and the subjective method was notes on her notebook. The rubric includes criteria such as the part of the lesson, lesson plan, preparation, and classroom management. The university supervisor takes notes to describe my performance in detail and to explain those areas that I didn't cover in the lesson. These notes helped me to understand why I received the score from the rubric and also offers alternatives to solve those areas that I have to improve.

Regarding the cooperating teacher, another teacher candidate stated that the cooperating teacher used an evaluation sheet: "While he was observing my lesson, he was taking notes about important areas to improve. Then he provides me a sheet with areas to improve." Nesbitt et al. (2014) suggested that even when feedback is delivered verbally, written feedback is more valuable for documentation purposes and provides additional resources for teacher candidate reflections.

Satisfaction With Relationship

Upon entering the practicum, teacher candidates may feel stressed, overwhelmed, and maybe even unprepared—all of which are legitimate feelings that influence their perceptions. With teacher candidates typically perceiving student teaching as being the most influential component of their preparation program (Ali & Khalid, 2015), both quality feedback and a supportive relationship are critical to teacher candidate development. The quality of individual relationships emerged as an influential theme in this study. Teacher candidates cited numerous areas where a better relationship among university supervisor, cooperating teacher, and teacher candidate would have made a significant difference. Liebhaber (2000) noted that practicum supervisors may help teacher candidates to discover and identify ways to improve their teaching skills. A few teacher candidates appeared to be resigned to the limited nature of their

interactions with cooperating teachers. One teacher candidate commented,

> Obviously, I want to receive feedback from my cooperating teacher because he is the one who is supposed to be present and helping me, but he is never present. He is always in the office, at sports competitions, medical appointments; he is never in the classroom. I am always with the other teacher candidate. The other teacher candidate is the one who provides me feedback.

Another teacher candidate did not feel completely comfortable with the level of professionalism she perceived from her cooperating teacher and with critical statements she heard him make about students. "What I don't like is that he speaks bad about his students, which is unprofessional. Other days he is on his cellphone." The cooperating teacher is often the primary mentor of the teacher candidate (Becker et al., 2019; Veal & Rikard, 1998). However, teacher candidates in this study perceived that a poor relationship with the cooperating teacher resulted in lack of quality feedback.

For the quality of the student teaching experience to be enhanced, the relationship between supervisors and teacher candidates must be based on reflective dialogue and mutual trust (Beck & Kosnik, 2002; Hobson et al., 2009; Hudson, 2016; Gwyn-Paquette & Tochon, 2001). A candidate remarked,

> I felt good and wasn't nervous, since the faculty supervisor was trusting and speaks positively. He always looks for ways for me to understand. That is what a teacher candidate needs . . . to feel comfortable and calm. He always motivates me and says that I will be fine.

Another teacher candidate expressed similar appreciation regarding the quality of relationship she had with her university supervisor:

> The university supervisor congratulated me for my nice work. Today, in my lesson he mentioned that I'm improving. I had to change my lesson plan because it was not developmentally appropriate. The faculty supervisor said that I shouldn't worry about following each step of the lesson plan. It's ok

to make necessary changes. The goal is that students learn something.

Although teacher candidates acknowledged the minimal time university supervisors spent visiting their school, the candidates were still satisfied with the quality of the relationship and feedback provided after each visit. To facilitate improvement in teaching practices, both cooperating teachers and university supervisors must be actively present during the practicum experience (Feiman-Nemser & Buchmann, 1987).

Conclusions and Implications

When done professionally, student teaching is recognized as a high-impact educational practice (Association of American Colleges and Universities, 2007) that provides physical education teacher preparation majors with real-world hands-on practice that cannot be simulated in a university classroom setting. Although most teacher preparation programs strive to match teacher candidates with quality cooperating teachers within quality physical education programs, research suggests that the physical education profession may still be facing an "Easy Street" identity crisis (Bulger & Housner, 2009; Kretchmar, 2006). Challenges specific to physical education teaching include marginalization, nonteaching, overuse of traditional teaching methodologies, emotional exhaustion, role stress, and job dissatisfaction (Gaudreault et al., 2018; Richards et al., 2018; Richards et al., 2019). Areas of longstanding concern applicable to the physical education student teaching experience include curriculum content, instructional methods, social support, and measurement of student learning outcomes (Bulger & Housner, 2009).

An interesting and challenging finding from this study is the perceived lack of attention and quality of feedback received from a few of the cooperating teachers. Acknowledging the sample size and the qualitative nature of this study (relying heavily on teacher candidate perceptions), we recognize that not all cooperating teachers provide similar quality of feedback (good or bad) or develop teacher candidates in the same way. With the shared experiences of teacher candidates in this study, and with the goal to improve the quality of the student teaching experience, we recommend that university supervisors and cooperating teachers take time to reflect upon their

own interests and passions for teaching physical education, review their performance as supervisors and role models, and look for ways to further improve the overall quality of the experience within physical education student teaching.

When facing the real-world challenges of teaching physical education, teacher candidates often need immediate help and guidance. The professionals best suited to provide guidance are cooperating teachers and university supervisors. Collaboration between cooperating teachers and university supervisors is essential when it comes to feedback intended to address issues that arise during the practicum. Setting goals and expectations first and then monitoring teaching experiences could provide opportunities for congruent and relevant feedback for teacher candidates. Such learning experiences can facilitate the construction of new knowledge and develop high-quality teaching behaviors.

Based on insights and implications found throughout this report, we recommend the following strategies for enhancing student teaching experiences:

1. Encourage a collaborative and supportive environment among cooperating teachers, university supervisors, and teacher candidates. For example, implementation of an alternative model of supervision in which all three members of the triad share decision making and have an equal voice in the student teaching experience (Portelance et al., 2016; Veal & Rikard, 1998). This may include shared observation times and group (triad) feedback sessions held every other week.
2. Provide ongoing and mandatory mentoring workshops with a focus on professional development for both cooperating teachers and university supervisors with the goal to better prepare supervisors to guide teacher candidate development. It is important for cooperating teachers, university supervisors, and teacher candidates to understand the goals, roles, and expectations within the student teaching practicum experience (Russell & Russell, 2011; Tillema, 2009).
3. Address socialization factors within the physical education practicum experience including reflections and discussions on quality physical education, role stress, feeling of marginalization, and authenticity in the classroom (Cherubini,

2009; Gaudreault et al., 2018; Richards et al., 2018, 2019). Members of the student teacher triad can ask themselves, how do I contribute to a positive and productive working environment? What is the quality and quantity of feedback that I give and receive? Is the feedback immediate, consistent, and encouraging? How do my actions as a teacher candidate portray my enthusiasm for physical education? How do my actions as a supervisor portray interest in my teacher candidate's development as a future educator?

4. Examine teacher preparation curriculum to ensure that practicum coursework includes purposeful and effective assignments that link theory development with skill practice for teacher candidates (Hennissen et al., 2017). Provide additional training of all supervisors as needed to implement and hold students accountable for assignments and ultimately allow teacher candidates to develop both content knowledge and practical applications. This training includes cooperating teachers being brought into the fold as "coeducators" with knowledge about curriculum program learning goals and specific assignments linking theory to practice (Hennissen et al., 2017).
5. Focus on assisting student teachers with lesson planning, instruction, and reflection throughout the practicum experience. For example, Becker et al. (2019) support implementation of Content-Focused Coaching training sessions (e.g., working with video examples, group discussion, and role-play) during prelesson conferences and weekly seminars to enhance learning and help develop teaching competencies.
6. Provide daily (via cooperating teachers) and weekly (via university supervisors) feedback to teacher candidates. This feedback comes as formal or informal daily "debriefings" and as taking the time in weekly seminar coursework to address program learning goals and other sources of feedback (e.g., teacher candidate self-reflections). With teacher candidates needing time daily to speak with supervisors (Liebhaber, 2000), these daily or weekly debriefings may also include purposeful time set aside for teacher candidates to be able to

discuss openly and honestly their progress and their feelings about the developmental process.

Further study is needed before any conclusions about the quality of feedback provided by physical education teaching supervisors and mentors can be drawn. Hearing directly from supervisors and learning about their perceptions of their quality of feedback, and about the theory and methods behind the feedback, would be a next step in this line of inquiry. A comparison of interpretations from shared feedback between teacher candidates and supervisors certainly would also be helpful in examining interactions inherent within the triad. A study of the effectiveness of feedback (i.e., timing, delivery, interpretation) in the process of teacher candidate development is of utmost interest. This study has highlighted a clear need for the development of strategies to foster better collaboration between teacher candidates, cooperating teachers, and university supervisors (Portelance et al., 2016).

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PHYSICAL ACTIVITY

Testing an Integrated Model of Interest Theory and Self-Determination Theory in University Physical Activity Classes

Joseph Opiri Otundo and Alex C. Garn

Abstract

Despite close links between the tenets of self-determination theory (SDT) and the concept of interest, few studies have closely investigated their integration in the area of physical Activity (PA). This study explored the nature of situational interest and need support. Surveys were administered at two data points (4-week window) to college students (n = 347) enrolled in PA classes. Confirmatory factor analysis results point to needs support as a separate factor associated with situational interest. Structural equation model analysis presented an acceptable fit, $\chi^2 = 195.825$ df = 83, $p < 0.05$, CFI = .953, TLI = .932, RMSEA = .063, SRMR = .049. Situational interest and need support are separate factors. Situational interest and optimal challenge have an inconsistent relationship with situational interest. Overall findings support the integration of interest theory and SDT, with clearer integration of personal interest into SDT compared to situational interest.

The importance in the relationship between motivational and physical activity (PA) outcomes has been widely documented in previous research (Gunnell et al., 2014; Standage et al., 2003). Self-determination theory (SDT; Deci, 1992; Deci & Ryan, 1985; Ryan &

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Deci, 2000) and interest theory (Krapp, 1999) represent important motivational theories that help explain and predict PA outcomes. Although Deci (1992) reported close links between the tenets of SDT and the concept of interest, few studies have closely investigated theoretical integration in the area of PA. In this study, we explore relationships between SDT and interest theory constructs advocated by Deci (1992) and Krapp (1999). Specifically, we explore the nature of situational interest and need support.

SDT proponents have posited that self-determined motivation is fostered by a social environment that supports a person's basic psychological needs of autonomy, competence, and relatedness (Jang et al., 2016). Autonomy focuses on behavioral engagement that is self-endorsed. Competence is defined as engaging effectively in one's environment. Relatedness focuses on securing meaningful and fulfilling relationships. The social environment plays a significant role in satisfying basic psychological needs. For example, in PA settings, teachers who can support students' autonomy (e.g., provide choices), competence (e.g., provide skill-related feedback), and relatedness (e.g., provide personal support) will likely satisfy students' basic psychological needs. In SDT, this is called needs support (Jang et al., 2016). There is minimal evidence at this point, however, about the relation between a needs-supportive environment in PA and interest-related constructs. Therefore, this study investigated an integrated model of interest theory and SDT in university PA classes.

Self-Determination Theory

According to SDT, there are different types of motivational orientations that operate on a continuum ranging from amotivation to autonomous motivation (Deci & Ryan, 1985; Ryan & Deci, 2000; Reeve et al., 2004). Amotivation is expressed through feelings of incompetence, lack value for a task, and negative experiences (Reeve et al., 2004). Students at this stage of motivation do not see any reason for engagement in PA (Standage et al., 2007). Amotivation represents a complete lack of motivation to act. Controlled motivations occur when students feel coerced or when they do not fully endorse engaging in tasks (Ryan & Deci, 2000). Amotivation is characterized with continued presence of external monitoring and rewards (Reeve et al., 2004). Students' motivation and subsequent engagement in PA is influenced by external rewards and/or avoidance of

external punishment (Standage et al., 2007). Students may also rely on internal contingencies of reward or punishment to control their behaviors (Reeve et al., 2004).

With autonomous motivation, behavioral engagement is coordinated and assimilated as part of a person's lifestyle and self-system (Ryan & Deci, 2000). The values attached to behavior are stable aspects of life and are part of a person's personal identity (Reeve et al., 2004). Similarly, autonomous motivation represents engagement in an activity for its own sake (Ryan & Deci, 2000). A major goal of SDT is to explain how students develop autonomous motivation (Ryan & Deci, 2002). In PA settings, students who are autonomously motivated are moved to act because of the fun or challenges encountered in the activity rather than external pressures or rewards (Ryan & Deci, 2000). Scientists agree that human beings are endowed with autonomous motivation tendencies, but maintenance and enhancement of autonomous motivation requires supportive social environments (Deci, 1992). Finally, autonomous motivation is considered a healthy and adaptive form of motivation, whereas controlled motivation is an unhealthy and maladaptive form of motivation (Ryan & Deci, 2002).

One important precept of SDT is that autonomous motivation does not directly emerge from social factors (needs support), but instead is influenced by perceived needs satisfaction of autonomy, competence, and relatedness (Deci, 1992). Research has shown that social factors are directly related to needs satisfaction and indirectly related to motivation (Deci & Ryan, 1987; Gagne, 2003). In his research findings, Deci (1992) revealed how situational interest may be related to SDT constructs, especially needs support and satisfaction. Notwithstanding, Krapp (1999) explored the relationship between personal interest with needs satisfaction and motivational orientations. Even though there appear to be links between needs support, needs satisfaction, motivation, and interest constructs, little research has been completed to clarify these relations.

Interest Theory

Interest is categorized into situational interest and personal interest. Situational is the appealing effect of the characteristics of an activity, whereas personal interest is a psychological disposition toward a specific activity (Chen et al., 1999; Chen & Zhu, 2005).

Researchers have posited that personal and situational interests perform distinct functions toward student motivation (Chen et al., 1999; Sun et al., 2008). Specifically, situational interest typically attracts novice learners to be engaged in tasks, whereas personal interest is built on prior experience and guides long-term preferences for certain tasks or activities (Ryan & Deci, 2002). Due to the long-lasting nature of personal interest, scientists have concentrated on investigating situational interest. In other words, the rigid nature of personal interest makes it hard to alter. Situational interest not only is malleable but can also be manipulated and can be triggered by teaching strategies (Linnenbrink-Garcia et al., 2013). Deci (1992) also theorized a connection between person–task interactions and situational interest. Researchers have hypothesized six indicators of situational interest associated with person–task interactions: attention demand, challenge, instant enjoyment, exploration intention, novelty, and total situational interest (Chen et al., 1999).

Attention demand is the mental energy and concentrated cognition required for learning PA (Sun et al., 2008). Challenge is the level of difficulty in relation to a student's ability (Sun et al., 2008). Sun et al. (2008) defined instant enjoyment as the pleasure derived from engaging in PA. Exploration intention describes psychological aspects that require cognitive stimulation (Mitchell, 1993), and it is triggered by PA tasks that encompass concentrated cognition (Chen et al., 1999). Novelty is the gap between known information and information deficiency (Chen & Darst, 2001). Finally, total situational interest is the overall evaluation of student's situational interest in PA (Zhu et al., 2009).

Situational interest is part of the social environment in learning contexts (Linnenbrink-Garcia et al., 2013). Learning environments that support students' needs are likely to also trigger situational interest (Deci, 1992). According to Deci (1992), situational interest is a framework that explains how the social environment stimulates needs support and, in turn, influences needs satisfaction and motivational orientations. Deci (1992) has proposed that situational interest encompasses the person, activity, and the social environment. Students develop and maintain situational interest whenever their engagement in activities is completed in a social environment that upholds needs support. Nonetheless, a social environment that

fails to support students' needs satisfaction is associated with controlled motivation and interest disruptions (Linnenbrink-Garcia et al., 2013).

Self-Determination Theory and Interest Theory

There appear to be relations between personal interest and SDT motivation constructs (Krapp, 1999). Development of personal interest is often related to changes in the motivational structure of an individual. Students often develop personal interest based on experiences and exposure to ideas or activities over time. Thus, it seems plausible that students maintain personal interest in a task when they assess and feel that they experience autonomous motivation (Krapp, 2005). Based on literature, it appears that autonomous motivation can promote personal interest but that controlling motivation is likely to undermine personal interest.

A recent study established that athletes' personal interest in sports was significantly predicted by autonomous motivation (Gillet et al., 2012). Examining the relationship between motivation and interest, Goudas et al. (1994) established that students who reported autonomous motivation also revealed higher levels of personal interest, whereas controlled motivation was associated with boredom and disruption of the learning process. A study with university students found association between autonomous learning motivation and high personal interest (Müller & Louw, 2004). Accordingly, this general pattern of relationships appears to be present across many contexts. Examination of PA among breast cancer survivors showed that SDT constructs explained 20% of the variance in PA (Milne et al., 2008). Competence was found to be major predictor of PA. A randomized controlled trial with women found that application of autonomous forms of motivation led to higher levels of PA (Silva et al., 2010). A study examining the role of social support reported an increase in PA interest among students who received social support from their groups (Jago et al., 2009).

Although the studies discussed demonstrate links between SDT and interest theory, little empirical evidence is available for empirical connections to be made between the two theories in PA settings. Further, research that examines associations between SDT constructs and situational and personal interest is sparse. Therefore, this study investigated associations between situational interest, needs

support, needs satisfaction, autonomous and controlled motivations, and personal interest for students enrolled in university PA classes. The following hypotheses were made:

- **H_1:** Student reports of situational interest and needs support will have direct associations with needs satisfaction and indirect associations with motivation.
- **H_2:** Student reports of needs satisfaction will have direct relations with motivation and personal interest.
- **H_3:** Student reports of autonomous motivation (positive) and controlled motivation (negative) will have direct relations with personal interest.
- **H_4:** Student reports of situational interest will have a direct association with personal interest.

Method

Participants

Participants were 347 students (20.5% males, 79.5% females; M_{age} = 20.42 years, SD = 1.78) enrolled in general kinesiology activity classes in a large research university in the Southeastern United States. Of the students in the sample, 40.1% were seniors, 25.1% were juniors, 25.6% were sophomores, and 8.9% were freshmen. A majority (73.8%) of the participants reported a Caucasian ethnicity, whereas 17.6% reported African American, 4.9% Asian/Asian American, 2.6% Hispanic, 0.9% Native American, and 3% others.

Instrumentation

Situational Interest

Indicators of person–task interactions were measured via the 24-item situational interest scale (Chen et al., 1999). The target activity was the warm-up. Immediately after the warm-up tasks, participants responded to this questionnaire. Example items include (1) "This activity is new to me" (novelty); (2) "This activity is complicated" (challenge); (3) "It is fun for me to try this activity" (enjoyment); (4) "I was very attentive all the time" (attention demand); and (5) "I want to discover all the tricks of this activity" (exploration intention). Each item was answered on a 5-point scale ranging from 1 (*very untrue*) to 5 (*very true*). This scale has been used widely in PA contexts.

Needs Support

Measures of autonomy, competence, and relatedness support were measured with a 15-item scale (6 autonomy support, 4 competence support, and 5 relatedness support) used by Standage et al. (2006). Items measuring social indicators started with the phrase "During this activity..." and sample items include (1) "the teacher listened to how I would like to do things" (autonomy support); (2) "the teacher made me feel like I was good at this activity" (competence support); and (3) "the teacher encouraged me to work with others in practice" (relatedness support). Each item was answered on a 5-point scale ranging from 1 (*very untrue*) to 5 (*very true*). Standage et al. (2006) reported reliability in these scales.

Needs Satisfaction

Needs satisfaction was measured on the Basic Needs Satisfaction in Sport Scale (Ng et al., 2011). Three subscales in the Basic Needs Satisfaction in Sport Scale measure students' autonomy, competence, and relatedness satisfaction. Students were asked to respond to the items regarding their feelings and experiences in the activity class instead of in sport. Each scale comprised five items. Autonomy satisfaction has five items (e.g., "In my class, I get opportunities to make choices"). Competence satisfaction was measured with five items (e.g., "I can overcome challenges in my class"). The relatedness satisfaction questionnaire has five items (e.g., "In my class, I feel close to other people"). Each item was measured on a 5-point scale ranging from 1 (*not true at all*) to 5 (*very true*).

Motivation

Autonomous motivation and controlled motivation were measured with the 20-item Perceived Locus of Causality Scale developed by Goudas et al. (1994). The scale was modified to replace "PE" with "activity class." Items begin with common stem "I take part in this activity class..." and a sample response is "because it is fun." Each item was answered on a 5-point scale ranging from 1 (*not at all true*) to 5 (*very true*).

Personal Interest

Personal interest toward PA was measured with Trautwein et al.'s (2006) personal interest scale. The personal interest questionnaire contains three items assessing each student's personal interest in PA.

Students were asked to think about the PA course they are enrolled in and answer questions about their interest in it (e.g., "Because this class is fun, I wouldn't want to give it up"). Each item was answered on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Procedures

In accordance with the institutional review board, this research was approved. We then liaised with the university PA course instructors to schedule date and time for data collection. During the data collection sessions, we first distributed consent forms, and participants who accepted to participate in the research were issued questionnaires. We then distributed surveys, outlined the instructions for filling the survey, explained the procedure, and answered questions from the participants. The instructors stepped outside when questionnaires were administered.

Data were collected during a 4-week window. At the first data point, the participants filled out a questionnaire focusing on basic demographic information (activity class, age, gender, classification, and race), indicators of situational interest, and needs support. The second data point was conducted after 4 weeks. At the second data point, the questionnaires assessed needs satisfaction, motivation, and personal interest. Data were collected from eight PA classes: tennis, tai chi, jogging, yoga, boot camp, weight training, aerobic dance, and golf. In both phases, participants took approximately 10 to 15 min to fill out the questionnaires. These lifetime physical activities were selected because they are likely to elicit personal interest and demonstrate the importance of maintaining health and wellness throughout the course of a lifetime.

Data Analysis

Prior to data analysis, screening was done for input accuracy, missing data, normality, and outliers. We used a series of confirmatory factor analyses (CFA) to disentangle relationships between situational interest and needs support. Specifically, we used CFAs to determine if situational interest and needs support represented a single factor of the social environment or two related but separate factors of the social environment. We used structural equation modeling (SEM) to simultaneously test the four hypotheses.

SEM is an approach that combines a measurement model and a structural model (Kline, 2015). The measurement model consists of using CFA procedures to determine how well the theorized covariance matrix matches the sample covariance matrix (i.e., overall model fit and parameter estimates). The structural model consists of a series of regression equations that provide information on relationships among latent variables in the structural model. In other words, SEM tests theoretical relationships between latent constructs, apart from testing direct and indirect effects, and mediating relationships among variables (Byrne, 2013). SEM assumes that all variables measured have some unique variance and error that must be accounted for in the explanatory model (Byrne, 2013). A major strength of SEM, therefore, is that it parcels reliable variance from unique variance and measurement error in the same fashion as CFA. Notwithstanding, in a cross-sectional study, SEM cannot determine causal relationships.

H_1, H_2, H_3, and H_4 were tested via SEM in IBM AMOS version 22. Model fit is based on generally accepted thresholds for the chi-square goodness-of-fit test (χ^2), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and the root-mean-square error of approximation (RMSEA). CFI and TLI values ≥ 0.90 reveal an adequate fit and values $\geq .95$ reflect a good fit of the model (Kline, 2015). Generally, the cut-off value for RMSEA is .06, even though values ≤ 0.08 indicate realistic errors of approximation in the population.

Results

Descriptive Statistics

Table 1 shows descriptive statistics, internal reliability coefficient (Cronbach's alpha), and correlation estimates for the indicators of situational interest. Significant correlations were noted among the variables in the two subscales in situational interest and needs support subscales. The highest correlation was between instant enjoyment and total situational interest. Novelty and challenge had weak correlations with the each of the situational interest indicator variables. All the observed variables had means above the midpoint of a 5-point Likert scale. Overall, there were positive correlations between autonomy support (AS), competence support (CS), and relatedness support (RS). On a 5-point scale, AS, CS, and CS had means above the midpoint.

Table 1
Internal Reliability, Means, and Correlations for Measured Variables

Variable	1	2	3	4	5	6	7	8	9
Ad	1								
Ch	.122*	1							
Enj	.585**	.183**	1						
Ex	.440**	.202**	.587**	1					
Nov	.271**	.236**	.311**	.405**	1				
Tot	.496**	.145**	.847**	.558**	.359**	1			
AS	.375**	−.047	.353**	.240**	.088	.294**	1		
CS	.360**	−.051	.318**	.185**	.127*	.266**	.767**	1	
RS	.274**	−.030	.287**	.180**	.117*	.223**	.718**	.831**	1
M	3.819	2.935	3.866	3.585	3.227	3.916	4.096	4.416	4.438
SD	.724	.768	.644	.767	.851	.711	.605	.541	.553
α	.862	.696	.844	.833	.711	.899	.876	.889	.899

Note. Ad = attention demand; Ch = challenge; Enj = enjoyment; Ex = exploration intention; Nov = novelty; Tot = total situational interest; AS = autonomy support; CS = competence support; RS = relatedness support.

*$p \geq 0.05$ (2-tailed). **$p \geq 0.01$ (2-tailed).

Confirmatory Factor Analysis

A series of CFA tests examined the factor structure of situational interest. Specifically, four models were tested. Model 1 was a single-factor model that included six indicators of situational interest and three needs support indicators. Model 2 was a two-factor model that included a situational interest factor with six indicators and a needs support factor with three indicators. Model 3 was a modified two-factor model that excluded challenge and novelty, which had low factor loadings. Model 4 consisted of a three-factor model that added a third factor that represented secondary situational interest that encompassed challenge and novelty. Table 2 shows fit indices. Results show that Model 3 presented a good fit, $\chi^2 = 42.058$, $df = 13$, $p < 0.05$, CFI = .980, TLI = .968, RMSEA = .071, SRMR = .050.

Table 2
Tested CFA Models

Model	χ^2	SB-χ^2	*df*	CFI	TLI	RMSEA	SRMR
1	745.171	643.170	27	0.531	0.375	0.256	0.159
2	99.422	88.257	26	0.953	0.934	0.083	0.059
3	42.058	35.443	13	0.980	0.968	0.071	0.050
4	87.081	77.156	24	0.960	0.939	0.080	0.054

Factor	UFL	*SE*	SFL	h^2	u^2
Situational interest					
Attention demand	1.000		0.606	0.368	0.632
Instant enjoyment	1.413	0.141	0.964	0.929	0.071
Exploration intention	1.094	0.117	0.618	0.382	0.618
Total interest	1.425	0.136	0.877	0.769	0.231
Needs support					
Autonomy support	1.000		0.818	0.669	0.331
Competence support	1.028	0.046	0.941	0.885	0.115
Relatedness support	0.985	0.052	0.881	0.777	0.223

Note. UFL = unstandardized factor loadings; SE = standard error of UFL; SFL = standardized factor loading; h^2 = explained variance of indicator by factor; u^2 = unexplained variance of indicator.

The CFA results did not support a single situational interest–needs support factor. Specifically, needs support was a different factor and not part of situational interest. Challenge and novelty were also dropped from the final model because of low common variance with other situational interest factors, which has been a problem in previous research (Garn, 2017; Roure & Pasco, 2018). Based on this outcome, Model 3 was selected and entered in the SEM analysis. Table 2 shows the factor loadings, explained variance, and unexplained variance for the indicators of situational interest and needs support. Situational interest explained the greatest percentage of variance in instant enjoyment (93%) and the least percentage in attention demand (37%). Besides, needs support explained prominent level of variance in autonomy, competence, and relatedness support.

Structural Equation Modeling

SEM analysis tested the measurement model and structural relationship between interest theory and SDT constructs. Based on the goodness of fit tests, the sample covariance matrix from the model presented an acceptable fit, $\chi^2 = 195.825$ $df = 83$, $p < 0.05$, CFI = .953, TLI = .932, RMSEA = .063, SRMR = .049. Table 3 shows regression coefficients and explained variances among latent variables (needs satisfaction, autonomous motivation, controlled motivation, and personal interest).

Table 3
Regression Coefficients and R-*Square Values of SEM Analysis*

Structural relationships	B	*SE*	*p*	β	R^2
Needs satisfaction					0.332
Situational interest	0.302	0.048	0.001	0.418	
Needs support	0.248	0.058	0.001	0.272	
Autonomous motivation					0.602
Needs satisfaction	1.060	0.104	0.001	0.776	
Controlled motivation					0.003
Needs satisfaction	−0.075	0.088	0.395	−0.052	
Personal interest					0.573
Situational interest	0.039	0.045	0.382	0.053	
Needs satisfaction	0.360	0.144	0.012	0.351	
Autonomous motivation	0.294	0.83	0.001	0.446	
Controlled motivation	−0.129	0.035	0.001	−0.180	

H_1 Findings

SEM results partially supported H_1. There was a direct relationship between situational interest and needs satisfaction and between needs support and needs satisfaction. Situational interest had a positive indirect association with autonomous motivation (β = .325, $p < .05$) through needs satisfaction. There was not an indirect relationship between situational interest and controlled motivation (β = −.022, $p > .05$). Similarly, needs support had a positive indirect association with autonomous motivation (β = .211, $p < .05$) through

needs satisfaction, but no indirect relation was present with controlled motivation ($\beta = -.014$, $p > .05$).

H_2 Findings

Hypothesis H_2 was partially supported. Results revealed a strong relationship between needs satisfaction and autonomous motivation. However, the relation between needs satisfaction and controlled motivation was not significant. Finally, results revealed a significant direct relationship between needs satisfaction and personal interest.

H_3 Findings

Results fully supported H_3. There was a direct positive association between needs satisfaction and personal interest and between autonomous motivation and personal interest. Personal interest was directly predicted by needs satisfaction ($b = .28$) and autonomous motivation ($b = .45$). The relationship between controlled motivation and personal interest was negative with a weak magnitude. Personal interest was negatively predicted by controlled motivation ($b = -.18$).

H_4 Findings

Contrary to hypothesis H_4, the relationship between situational interest and personal interest was not significant. This outcome contradicts previous findings that have supported this association (Chen & Darst, 2001). Finally, results revealed indirect effects as follows: situational interest on autonomous motivation via needs satisfaction (.328), needs satisfaction on personal interest via autonomous motivation (.304) and controlled motivation (–.230), and needs support on autonomous motivation via needs satisfaction (.211).

Discussion

This study explored the structural relationships between interest theory and SDT. Specifically, it investigated the relationships between situational interest, needs support, needs satisfaction, autonomous motivation, and personal interest among college students enrolled in PA classes. Prior to testing major study hypotheses, CFA tests examined needs support constructs, autonomy support, competence support, and relatedness support as potential indicators of situational interest. This section discusses the explanation of initial CFA findings, followed by the results of the four study hypotheses.

Nature of Situational Interest and Needs Support

Although a nine-indicator model of situational interest that integrates dimensions of needs support was hypothesized, findings are not supportive. Specifically, results clearly show that situational interest and needs support are separate factors. The correlation between needs support and situational interest is positive, but small-to-moderate, which also points to less overlap between these two aspects of the social environment. The role of social indicators in situational interest from an SDT perspective remains uncertain despite clear theoretical links (Deci, 1992). It is possible that needs support is a source of situational interest rather than part of its internal dynamics. It is also possible that situational interest and needs support are two distinct aspects of the social environment in PA settings. Because this is a cross-sectional study without a random sample, the design cannot establish causation. Future research should investigate the relationship between needs support and situational interest to ascertain if it is a reciprocal relationship or if needs support may be a necessary source to facilitate situational interest.

In this study, challenge and novelty were poor indicators of situational interest. In the past literature, the relationship between challenge and other situational interest indicators produced conflicting results. For instance, some studies found moderate correlation between challenge and total situational interest (Chen & Darst, 2001; Chen et al., 1999; Zhu et al., 2009). Notwithstanding, at least one study reported an insignificant relationship between challenge and total interest (Ding et al., 2013). In these findings, the insignificant association between challenge and other situational interest indicators supports the notion that challenge has an inconsistent association with situational interest (Chen et al., 2001).

Integration of Interest and Self-Determination Theories

Overall, findings generally support the integration of interest theory and SDT. Results partially support hypothesis H_1 by identifying the direct relationship between situational interest and needs satisfaction and between needs support and needs satisfaction. Central to both SDT and interest theory is the assumption that elements of the social environment influence needs satisfaction (Deci, 1992; Krapp, 2005; Standage et al., 2006). Research has not

investigated the joint contributions of situational interest and needs support on needs satisfaction. Situational interest was a stronger predictor of needs satisfaction than of needs support, which was surprising. This is a unique finding with important implications. Specifically, person–task interactions associated with situational interest (e.g., attention demand and instant enjoyment) appear to be a meaningful source for needs satisfaction above and beyond needs support. Therefore, situational interest appears to be closely intertwined with students' needs satisfaction in university PA classes.

As hypothesized (H_2), perceived needs satisfaction was directly associated with autonomous motivation. This outcome is consistent with principles of SDT, which holds that autonomous motivation is influenced by the extent of satisfaction of the three needs (Standage et al., 2006). On account of this, students' autonomous motivation is anchored to the extent to which students have opportunities to exercise their own volition, are competent to participate in class activities, and receive positive feedback, among other means of relatedness. Nonetheless, results from this sample indicate a lack of relationship between needs satisfaction and controlled motivation, contradicting the hypothesis and theoretical undertones of SDT. For example, a study with college athletes found a negative association between needs satisfaction and controlled motivation (Gagne, 2003). Athletes whose coaches applied controlled motivation reported lower levels of needs satisfaction. For this reason, future studies might explore the relationship between needs satisfaction and controlled motivation. Last, results support H_2 by revealing a direct relationship between needs satisfaction and personal interest. Hence, these outcomes support theoretical approach (Krapp, 1999) suggesting that students' personal interest is directly associated with needs satisfaction.

In support of H_3, perceived autonomous motivation had a direct relationship with personal interest. These findings are consistent with literature that links autonomous motivation with students' personal interest (Krapp, 1999, 2005). In other words, students' personal interest is predisposed in a learning environment that is autonomously motivating. Although weak, there is a significant negative association between controlled motivation and personal interest. This finding supports Krapp (1999), who postulated that personal interest is negatively predisposed by controlled motivation. Students

who are exposed to a controlling learning environment might report low levels of personal interest.

Contrary to H_4, results from this study do not show a direct association between students' personal interest and situational interest in PA. This contrasts with the theoretical undertone of interest theory and research findings that have suggested a direct relationship between these two variables (Chen et al., 1999). It is possible that students' amount of personal interest toward the class content was already well established, reducing the effect of situational interest. University students may be beyond this point in their learning of the physical activities. Similarly, the timing of situational measurement may also have been an issue. Situational interest was measured toward the end of an 18-week semester during which the class met three times per week. This may have minimized the relationship between situational interest and personal interest.

In summary, findings support researchers who have suggested a connection between interest theory and SDT (Deci, 1992; Krapp, 1999). However, this research has limitations. First, results from CFA did not support the hypothesized model, which resulted in testing alternative models. Second, this was a cross-sectional study and therefore the results do not portray causal effect. Future longitudinal studies can be conducted with specific interventional strategies. Also, future studies can focus on one task to determine if there is a difference in the outcome. Finally, it is recommended that a future longitudinal study investigate if there is any causal relationship between needs support and situational interest.

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PHYSICAL ACTIVITY

The Influence of Posting Physical Activity Posts to Social Networking Sites on Young Adults' Physical Activity Engagement and Motivational Profiles

Celia DeVitis, Zack Beddoes, Debra Sazama, Teresa Hepler

Abstract

This study examined the physical activity and motivational effects of young adults posting physical activity posts to a social networking site. It used a repeated-measures, between-group design. Fifty-eight young adults from an introductory fitness course chose to participate in this study. Participants were divided into two groups: (a) posting physical activities to social networking sites and (b) not posting physical activities to social networking sites. Participants' physical activity and motivation were tracked throughout the intervention. The social networking group was less physically active at the beginning of the intervention but did not differ significantly from the control group at the end of the intervention. A t test revealed a significant increase in physical activity from baseline for the social networking group ($p = 0.001$) but not for the non–social networking group ($p = 0.44$). There were no significant differences relative to motivational indices between the two groups, although extrinsic regulation ($p = 0.06$) and amotivation

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(p = 0.06) displayed marginal significance. Social networking has become a part of life. This platform may hold promise for increasing physical activity levels among young adults. More research is needed on how social media may influence various motivational subconstructs.

Declining rates of physical activity (PA) among children and young adults (Strong et al., 2005; Troiano et al., 2008) is problematic given the link between physical inactivity and adverse health concerns such as diabetes, hypertension, stroke, and cardiovascular disease (U.S. Department of Health and Human Services, 2018). Conversely, research has suggested that regular PA engagement can reduce the risk of cardiovascular disease and other chronic diseases for individuals of all ages (Chakravarthy & Booth, 2004; McGavock et al., 2006). As a response to health concerns, the *Physical Activity Guidelines for Americans* (U.S. Department of Health and Human Services, 2018) recommends adults participate weekly in 150 min of moderate PA, 75 min of vigorous PA, or a combination of the two. Muscle-strengthening activities of a moderate to vigorous (MVPA) nature involving all major muscle groups should be performed at least 2 days/week. Yet, notwithstanding the known benefits of regular PA engagement (e.g., increased aerobic fitness, healthier body composition, skeletal health), fewer than 20% of adults meet the current PA recommendations (Centers for Disease Control and Prevention, 2013).

Self-Determination Theory and Physical Activity

Given the low percentage of individuals choosing to engage in healthful levels of PA, self-determination theory (SDT; Deci & Ryan, 1985) has been used as a theoretical framework in exploring why some individuals are more physically active than others (e.g., Sun & Chen, 2010). Within the SDT framework, motivation lies on a continuum ranging from amotivation to intrinsic motivation. Amotivation is characterized by an absence of value toward an activity, which generally results in the lack of identification to the task. Extrinsic motivation consists of behavior that is driven by external factors such as feeling compelled to accomplish a task for tangible rewards or to avoid punishment. Specifically, extrinsic motivation comprises four subconstructs: (a) external regulation, (b) introjected regulation, (c) identified regulation, and (d) integrated regulation. External regulation implies an individual is involved in an activity for

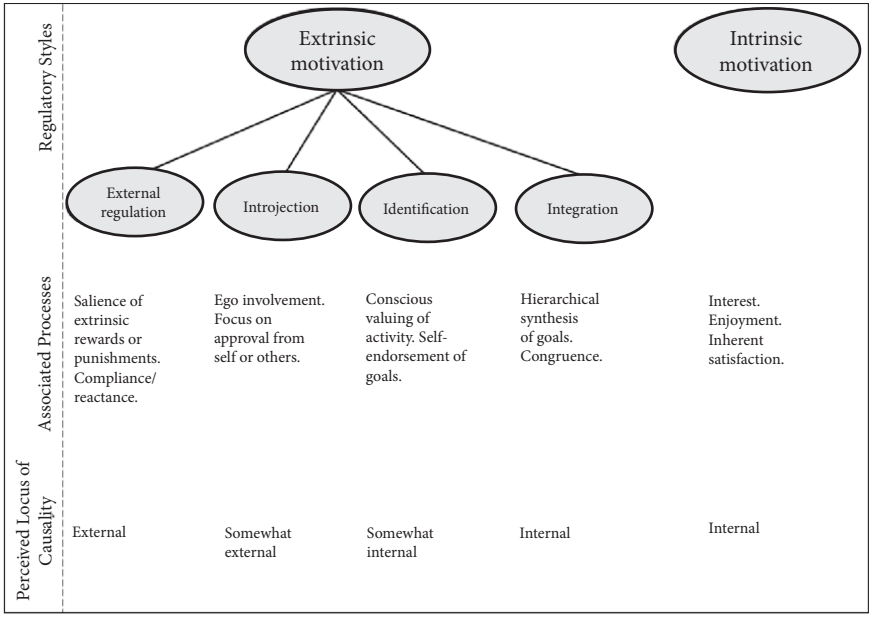
a reward or to avoid punishment (Barkoukis et al., 2008) and is the most representative type of extrinsic motivation. Introjection suggests an individual is beginning to internalize the reasons for their actions but is not fully self-determined in a given task. Identified regulation represents behaviors that are valued and considered important. Within this subconstruct, behavior is perceived as a choice. Integrated regulation refers to the most self-determined type of extrinsic motivation. Integrated regulation is goal directed but not fully internalized (Barkoukis et al., 2008).

Intrinsic motivation denotes engagement in an activity for enjoyment. Figure 1 demonstrates the nature of adjacent subscales along the motivational continuum. Movement along the continuum occurs as a person becomes more or less self-determined toward a given task. The concept of internalization describes how a person's motivation to engage in a behavior can range from amotivation, to passive compliance, to active personal commitment (Ryan & Deci, 2000a). Ryan and Deci (2000a) suggested that increased internalization is accompanied by greater persistence, heightened self-perception, and enhanced quality of engagement.

SDT postulates that basic psychological needs of autonomy, competence, and relatedness are universal and essential for ongoing psychological growth, internalization, and well-being (Van den Broeck et al., 2016). Applied to the educational setting, SDT proposes that a student must perceive sufficient autonomy ("I have choices"), competence ("I can"), and relatedness ("I feel encouraged by my teacher and peers") support to be self-determined in a task.

Vallerand (1997) expanded SDT to include three levels of generality: situational motivation, contextual motivation, and global motivation (see Figure 2). Situational motivation is the most malleable and refers to an individual's motivational profile for a specific activity. This includes how a person feels while engaging in the activity (e.g., a throwing and catching lesson or a kicking lesson in soccer). Contextual motivation is how a person feels about a life context (e.g., sports, physical education, running). Contextual motivation is a derivative of a multitude of experiences at the situational level. The most generalized level of motivation is the global level because it is the least malleable of the three levels and reflects a person's life traits and dispositions (e.g., how a person feels about engaging in an active lifestyle).

Figure 1
A Taxonomy of Human Motivation

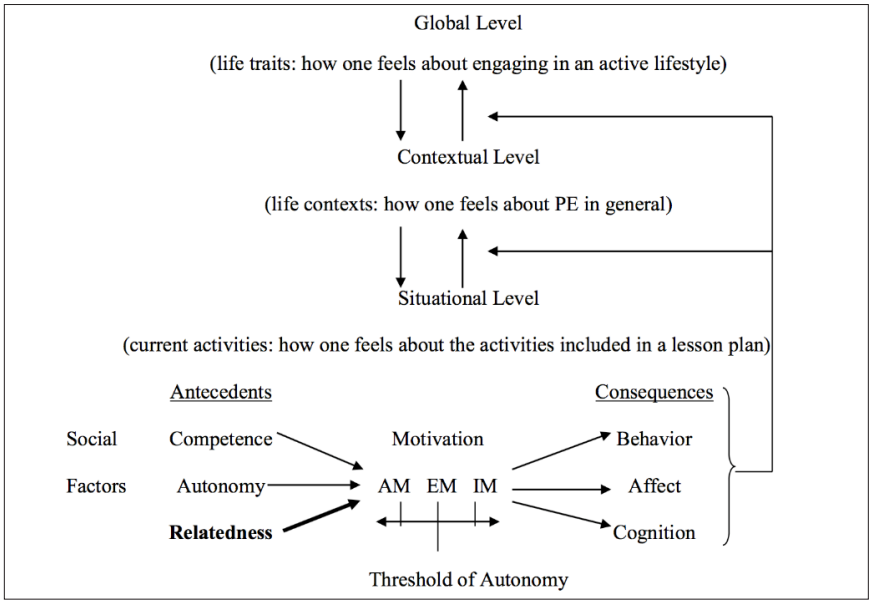


Note. From "Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions," by R. M. Ryan and E. L. Deci, 2000a, *Contemporary Educational Psychology*, *25*(1), p. 61 (https://doi.org/10.1006/ceps.1999.1020).

Social Media and Motivation

Usage of social networking sites (SNS) is among the most common activity of contemporary young adults (Schurgin O'Keeffe & Clarke-Pearson, 2011). Alt (2015) suggested that social networking engagement may be positively associated with extrinsic motivation and amotivation but mediated by fear of missing out (Alt, 2015). Fear of missing out indicates a pervasive apprehension that others might be involved in rewarding experiences apart from oneself—facilitating a desire to stay continually engaged in what others are doing (Przybylski et al., 2013). Accordingly, fear of missing out may enhance a person's engagement with SNS as a medium through which they maintain connectedness and relatedness with others (Alt, 2015).

Figure 2
Hierarchical Model of Self-Determination Theory



Note. AM = amotivation; EM = extrinsic motivation; IM = intrinsic motivation. Model adapted from Prusak et al. (2004) to illustrate the multidimensional nature of SDT and to represent its theoretical construct. Relatedness is **bolded** to suggest the particular nutriment isolated in the present study.

Some scholars advocate the need to embrace SNS as an educational tool (e.g., Ito et al., 2009; Jenkins, 2009). Young adults have reported utilizing SNS and generally preferring group-based approaches to study and communication with others (McMahon & Pospisil, 2005). Tarantino et al. (2013) observed that students may develop connections with peers, establish a virtual community of learners, and increase overall learning skills when engaging with SNS. However, the most effective method for incorporating SNS into the educational settings is unclear. A more recent study concluded that using SNS to post pictures of daily activities could increase self-awareness of PA levels and subsequently enhance PA engagement (Treadwell & Taylor, 2017). Teodoro and Naaman (2013) also reported that individuals who posted exercise posts to SNS were more likely to maintain adherence to an exercise program. Other studies

reported that posting physical activities or diet plans may be beneficial for accomplishing fitness goals (Consolvo et al., 2009).

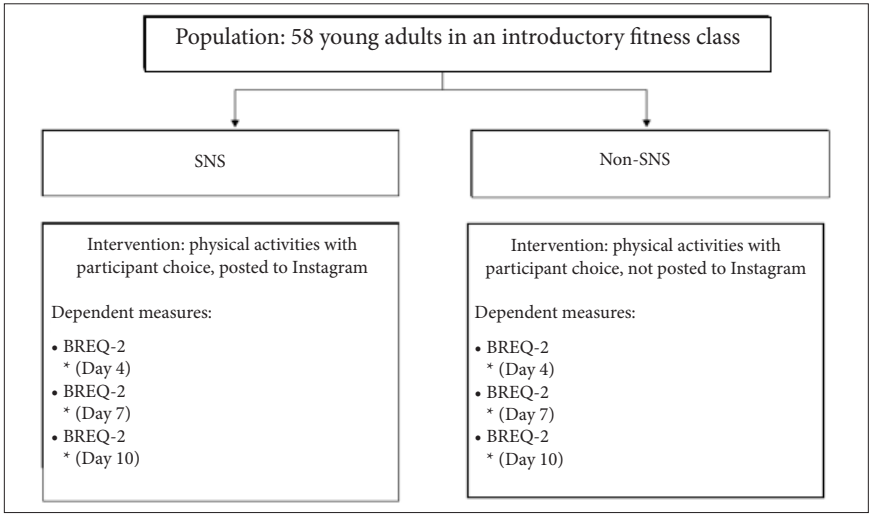
Because SNS may create a space to enhance social interaction, these outlets have the potential to enhance a young adult's perceived relatedness support and subsequent exercise patterns. To date, research examining the influence of posting to SNS on PA levels within an SDT framework is limited. Thus, this study examined PA levels and motivational profiles of young adults posting and not posting activities to an SNS. Specifically, the research questions included the following: (a) Does PA increase by a greater amount for young adults who post PA pictures to SNS compared to young adults who do not? (b) How does posting physical activities on an SNS influence a person's motivational profile toward PA?

Method

This study employed a repeated-measures, between-subjects design wherein each participant experienced one treatment (i.e., with or without posting to an SNS). Group A represented the treatment group and Group B the control group. Each group completed surveys on Days 4, 7, and 10 of the intervention (see Figure 3).

Figure 3

Procedures Map of BREQ-2 Survey Administration



Note. SNS = social networking site.

Participants

Approval for this study was obtained from the institutional review board prior to data collection. The sample of students who volunteered to participate in this study included 58 young adults (female, $n = 44$) ages 18 to 22 in an introductory fitness class. Baseline PA levels were tracked via Qualtrics, where participants reported general levels of engagement by selecting "daily," "2–3 times per week," "rarely," and "almost never." PA level percentages were calculated as follows: 43% exercised daily, 33% exercised 2 to 3 times/week, 0% rarely exercised, 1% almost never exercised, and 22% did not answer. Participants' PA included weight lifting, cardio, gymnastics, swimming, basketball, softball, and biking, among others. Students were also asked about SNS usage and the percentages were calculated as follows: 5% multiple posts/day, 5% once a day, 19% 2 to 3 times/week, 48% rarely, and 22% did not answer. Recording PA engagement and usage of SNS provided a richer description of the participants' daily practices and allowed us to draw more accurate conclusions from results.

Measures

We selected the instruments for this study with the aim of assessing PA levels and motivational profiles of participating students without involving extensive instrument familiarization.

Pedometers

The OMRON Walking Style pedometer, model HJ-720ITC, used in this study has two uniaxial piezoelectric acceleration sensors oriented at 90 degrees to each other to count steps, allowing it to accurately count steps when placed horizontally or vertically. This device was worn on the waistband and initial setup for the pedometer included setting the weight and stride length on the device for each student. The device tracked number of steps, distance, and caloric expenditure with a horizontal spring suspended lever arm moving up and down with acceleration of the hip joint during ambulation. Pedometers included the capability of being connected to a computer by a USB cable, allowing for data to be downloaded to a personal computer. A user account where up to 41 days of data could be uploaded was created for each participant. This instrument

has demonstrated high consistency and 3% absolute percent error whether worn at the waist or in the pocket under prescribed and self-paced walking conditions (Holbrook et al., 2009).

Behavioral Exercise Regulation Questionnaire (BREQ-2)

The Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2; Mullan et al., 1997) comprises four subscales assessing external (four items, e.g., "I exercise because other people say I should"), introjected (three items, e.g., "I feel guilty when I don't exercise"), identified (three items, e.g., "I value the benefits of exercise"), and intrinsic (four items, e.g., "I exercise because it's fun") regulations. In addition, four amotivation items from Mullan et al.'s (1997) initial item pool were included ("I don't see why I should have to exercise," "I can't see why I should bother exercising," "I don't see the point in exercising," and "I think that exercising is a waste of time"). Researchers have suggested that the BREQ-2 may prove useful in assessing amotivation for the development of a more complete understanding of motivation for PA (Markland & Tobin, 2004).

Procedures

Walking Style pedometers were distributed following appropriate calibrations and familiarization. Directions for wearing the pedometers were given in person and by subsequent email communication. Students were required to keep a log of daily steps, distance traveled, and caloric expenditure from the time they woke up until they went to bed. Students were familiarized through email with the BREQ-2 two days prior to data collection. In alignment with previous research (Prusak et al., 2004), surveys were completed on Days 4, 7, and 10 immediately following the activity. Surveys were electronically distributed at 12:00 a.m. on the specified days via Qualtrics survey software.

Participants were randomly selected for each group. Group A was emailed instructions relative to creating an account on a private SNS. Each group member in Group A received a list of all participants in that group. The list included names and an assigned username including a six-digit number to conceal their identity to any outside account. Group A participants spent one weekend "following" the other participants in Group A and the principal investigator. After

the SNS familiarization, participants practiced uploading a picture and writing a brief caption.

Both groups were instructed to wear the pedometer from the moment they woke up until the moment they went to bed for 14 consecutive days. Participants submitted data logs via email to Celia DeVitis on Day 7 (to enhance participant accountability for their data) and again the day proceeding the intervention. Data logs were subsequently de-identified, keyed, and secured in an electronic document by DeVitis to ensure all identities were concealed.

Participants in Group A uploaded a picture daily to their SNS account. Participants posted pictures of themselves being physically active and t used self-monitoring captions of what they were doing, including the duration and nature of the activity. Group B was only responsible for completing the data logs. The self-monitoring captions were required and assisted in keeping participants accountable for PA levels. Each participant was encouraged to ask questions or post responses on their peers' pictures so long as the comments were appropriate for an educational setting.

Analysis

Statistical analyses were performed using SPSS 25. Normality was inspected via visual graph inspection and analysis of skewness and kurtosis statistics for each dependent variable. Non-normally-distributed data were transformed through log transformations. Calculation of descriptive statistics followed confirmation of normality and transformations. The unit of analysis was at the individual level. Mean scores were calculated for each subscale and subsequent analyses were conducted using subscale means. Correlation analyses were conducted across dependent variables, which confirmed the simplex pattern of the subscales. Cronbach's alphas were performed on each of the survey measures, which determined internal consistency.

To answer the first research question, "Does PA increase by a greater amount in young adults who post PA pictures to SNS as compared to young adults who do not?" we used an independent-samples *t* test to determine any between-group differences in PA change across the intervention. To answer the second research question, "How does posting physical activities on SNS effect one's motivational profile towards PA?" we conducted a 2 (Group) × 3 (Trials) repeated-measures

analysis of variance to ascertain between-group and within-trial differences for each dependent variable assessing motivational indices (i.e., amotivation, external regulation, introjected regulation, identified regulation, intrinsic regulation).

Results

Table 1 shows descriptive statistics by group for each dependent variable. Alpha coefficients ranged from .67 to .81 and met or approached acceptable reliability standards based on an alpha of .70. The SNS group began with significantly lower mean PA scores at Day 4 (M = 6264.52) than the non-SNS group (M = 9262.66) at $t(50) = -3.044$, $p = 0.004$. At the end of Week 2, the SNS group (M = 8198.00) did not significantly differ from the non-SNS group (M = 8329.54) at $t(50) = -.112$, $p = 0.911$, indicating a greater PA increase for the SNS group than the non-SNS group. Low mean scores ranged from 3.36 to 4.08 for extrinsic regulation, 7.45 to 8.72 for introjected regulation, 9.56 to 11.20 for identified regulation, 13.09 to 13.95 for intrinsic motivation, and 0.22 to 0.50 for amotivation, indicating that the students were not disinterested in their PA and felt more self-directed than externally controlled. Specifically, motivational indices indicated higher scores for constructs representing more intrinsically-driven behavior.

Table 1
Descriptive Statistics and Internal Consistency for Each Measure by Group

	Social networking (n = 30)		Non–social networking (n = 28)	
Variable	***M***	***SD***	***M***	***SD***
Physical activity				
Baseline	6264.53	(2457.95)	9262.66	(4489.12)
Time 1	9299.07	(4047.99)	11674.54	(4163.86)
Time 2	8198.00	(3806.82)	8329.54	(4668.47)
External regulation				
Baseline	3.36	(3.51)	4.08	(2.90)
Time 1	3.42	(2.69)	5.09	(3.25)
Time 2	4.00	(3.66)	4.59	(3.87)

Table 1 (cont.)

Variable	Social networking (n = 30)		Non–social networking (n = 28)	
	M	***SD***	***M***	***SD***
Introjection				
Baseline	7.45	(2.72)	8.72	(2.54)
Time 1	8.15	(2.98)	9.57	(2.46)
Time 2	8.54	(3.19)	9.59	(2.99)
Identification				
Baseline	11.17	(1.20)	11.28	(1.21)
Time 1	11.42	(1.36)	11.52	(0.95)
Time 2	11.21	(1.44)	11.55	(0.80)
Intrinsic				
Baseline	14.14	(2.17)	12.56	(2.22)
Time 1	13.96	(2.49)	13.22	(2.19)
Time 2	13.96	(2.80)	13.09	(2.14)
Amotivation				
Baseline	0.23	(0.75)	0.68	(1.11)
Time 1	0.43	(0.90)	0.87	(1.55)
Time 2	0.83	(1.71)	0.50	(1.26)

Table 2 displays correlations between PA and motivational indices. Extrinsic regulation and amotivation are negatively correlated with PA, whereas identified and intrinsic regulation display significant positive correlations, indicating the more disinterested or externally-controlled a student felt, the less physically active they were. The significant positive linear correlations between extrinsic motivation and amotivation and between intrinsic and identified regulation reveal the expected simplex pattern where adjacent subscales are positively correlated and distal subscales are negatively correlated.

A one-sample t test revealed a significant within-group change for the SNS group between baseline (M = 6264.53, SD = 2457.95) and Week 1 (M = 9299.07, SD = 4047.99), $t(27) = 3.93$, $p = 0.001$, and a significant increase in PA across the intervention baseline (M = 9299.07,

Table 2
Correlation Matrix for Each Measure by Group

Variable	Steps	Ex	Intro	Ide	IM	Am
Steps	1.00					
Ex	−0.529*	1.00				
Intro	0.255	−0.024	1.00			
Ide	0.518*	−0.224	0.563*	1.00		
IM	0.522*	−0.478*	0.310	.748**	1.00	
Am	−0.510*	0.194	−0.434	−0.908**	−0.684**	1.00

Note. Ex = external regulation; Intro = introjected regulation; Ide = identified regulation; IM = intrinsic motivation; Am = amotivation.

* $p < 0.05$. ** $p < 0.01$.

SD = 4047.99) and Week 2 (*M* = 8198.00, *SD* = 3806.82), $t(27) = 3.29$, $p = 0.003$, suggesting that the SNS group increased in PA. An additional one-sample *t* test revealed a significant within-group change for the non-SNS group between baseline (*M* = 9262.66, *SD* = 4489.12) and Week 1 (*M* = 11674.54, *SD* = 4163.86), $t(23) = 2.59$, $p = 0.016$, but not between baseline (*M* = 9262.66, *SD* = 4489.12) and Week 2 (*M* = 8329.54, *SD* = 4668.47), $t(23) = -.781$, $p = 0.44$, indicating that the non-SNS group initially increased in PA as the intervention began but regressed into similar PA patterns by the end of the intervention. An independent-samples *t* test revealed a significant between-group difference for change in PA across the intervention, $t(50) = 2.25$, $p = 0.02$, $d = 0.61$, with the SNS group increasing PA by a mean of 1933.46 (*SD* = 4081.76) and the non-SNS group decreasing in PA (*M* = −933.12, *SD* = 5850.41), indicating that the SNS group experienced significantly more increase in PA across the intervention than the non-SNS group. Posting PA on an SNS did not have a significant effect on any of the subscale means, although extrinsic regulation, $F(1, 37) = 3.499$, $p = 0.06$, and amotivation, $F(1, 37) = 3.55$, $p = 0.06$, trended toward significance.

Discussion

This study examined the influence of social networking on PA levels and motivational profiles toward PA engagement of young

adults enrolled in a required fitness introduction course. For the first research question, results revealed a significant between-group difference for change in PA across the intervention. These findings align with those in studies suggesting that individuals who post motivational exercise posts to SNS are more likely to maintain adherence to an exercise program (Teodoro & Naaman, 2013). Posting to an SNS may be an efficient way for a person to enhance conscientiousness about PA levels. A study by Treadwell and Taylor (2017) indicated that middle school children who post about their PA engagement to SNS are more likely to attach importance to engaging in a PA lifestyle than children who do not post about their PA engagement.

It has been observed that young adults may be particularly attentive to social networking interactions, preferring group-based approaches to studying and social activities (McMahon & Pospisil, 2005). Many young adults have been using SNS since childhood and are likely accustomed to navigating this medium. Ito et al. (2009) proposed that individuals will learn in new ways using SNS and that educators should embrace these platforms. Results from this study support the potential usage of SNS as a tool for increasing PA among young adults. Given that habits maintained in adulthood are often formed in childhood (Boreham & Riddoch, 2001), physical educators can equip students with the knowledge and tools to use SNS for the purpose of increasing PA rather than as a substitute for PA engagement.

Possible explanations for the non-SNS group's declining PA levels compared to the SNS group's PA levels across the 2-week intervention could be that the non-SNS group experienced an initial placebo effect. It is not unreasonable that the novelty of participating in a research study, along with emails and increased personal attention, influenced the initial PA patterns of the control group. However, perhaps when the novelty wore off, these students regressed toward the original baseline mean (see Harvard Health Publishing, 2017).

Social Networking and Motivation Toward Physical Activity

Within the SDT framework, intrinsic motivation refers to doing something because it is inherently interesting and enjoyable. When motivation is internally—rather than externally—originating, enhanced affect, behavior, and learning may result (Deci & Ryan, 1985). Correlation analysis in this study suggests a positive linear

relationship between PA and identified regulation and between PA and intrinsic motivation, regardless of group assignment. Simply put, those who identified with the activities and whose motivation was intrinsically originating were more likely to engage in PA than their peers with more externally originating motivation or amotivation toward the activities. These findings align with research supporting the theoretical constructs of SDT (Deci & Ryan, 1985).

We hypothesized that posting daily pictures of PA to an SNS would increase self-determination relative to engaging in PA as a result of increased perceived relatedness support. This hypothesis was not supported in these data. In fact, between-group results suggest that posting to an SNS may have had the opposite effect and caused participants in the treatment group to feel compelled to post on the SNS and also compelled to engage in PA. These results would align with other research suggesting that posting to an SNS may be positively associated with extrinsic motivation and amotivation (Alt, 2015). It is also possible that treatment group participants perceived thwarted autonomy because they did not self-select an SNS and were additionally tasked with obligatory daily posting to a specified SNS. Research has suggested that autonomy support is a critical nutriment in influencing a person's intrinsic motivation (Deci, 1971). We additionally state that external regulators for participating in an activity can cause participants to lose interest in that activity.

Limitations

Limitations of the study include the purposeful selection of college-aged students in an introductory fitness course, thus limiting the generalizability of the findings. Likewise, this study included the use of convenience—rather than random—sampling and self-reporting of PA. Further, the sample size is relatively small, though repeated measures accounted for this. Student attrition and the unpredictable nature of performing research and self-report in an ecologically valid setting can also affect the study results. The duration of the study is an additional limitation. A longer study duration could influence student PA patterns and motivation in a way that a shorter intervention cannot detect.

Conclusion

Social networking has become a way of life for youth and young adults. Given the time that young people spend on SNS, posting pictures of PA participation and increased dialogue around PA participation hold the potential to be part of a public health tool for enhancing students' participation in health-enhancing levels of PA. University faculty and K–12 teachers alike have an opportunity to be forward-thinking by creatively utilizing online platforms to enhance student engagement in healthful behaviors. However, it is unclear to what extent posting to an SNS influences PA engagement. Posting to an SNS is autonomous and spontaneous in nature, and designing a controlled experimental study that involves posting to an SNS as the independent variable is riddled with challenges. Recent research has reported that middle school students who kept an online PA log were significantly more self-determined than their peers who did not keep a log (Fullmer et al., 2018). Perhaps the most important implication is for young adults and children to be aware of and competent in tracking their own PA engagement regardless of the medium. Keeping a personal PA log or journal may be helpful for some, but coupling individual reporting with public sharing of activities may increase a person's feelings of relatedness over time when the posts are more organic and autonomous in nature. However, more research is needed to support these conclusions.

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PHYSICAL EDUCATION REQUIREMENTS

Waivers, Exemptions, and Substitutions in Physical Education

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Abstract

The granting of waivers, exemptions, and substitutions (WES) for physical education appears to be on the increase in the United States. This study investigated the rationale behind and process of granting WES. Participants from three school districts were 10 physical education teachers, eight school principals, two school assistant principals, six students, and six parents. In addition, one state official participated in the study. Data came from three types of interviewing and the collection of relevant documents. These were analyzed through analytic induction and constant comparison and were reduced to key themes. Three forms of WES were identified: those that involved students participating in in-school activities in lieu of physical education, those that involved students participating in out-of-school activities in lieu of physical education, and innovative waivers that gave administrators the power to curtail provision of the subject. Policy regarding WES varied, resulting in a nonuniform and idiosyncratic system. The majority of principals, parents, and students, and a minority of physical education teachers supported the granting of WES. The space created for WES to evolve was created by the marginalization of physical education in relation to academic subjects and competitive sport; by the privileging of participation in physical activity over other objectives of the subject; and by low quality physical education. These findings provide clues for combating the increase of WES.

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During his keynote presentation at the National Physical Education Teacher Education (PETE) Conference in Myrtle Beach, South Carolina, Pate (2009), the eminent exercise physiologist of the University of South Carolina, summarized the research linking children's and youths' engagement in physical activity to their health and academic progress. He then reviewed research showing the limited participation of children and youth in physical activity and how this affected their health adversely. Pate subsequently made some fairly conservative suggestions about how schools could play a part in changing this state of affairs by providing high quality physical education, an expanded version of extracurricular sport, and by incorporating physical activity in other parts of the school day. Finally, Pate noted that educational policy makers have, to date, provided limited support for implementation of the initiatives he had recommended.

Sadly, Pate's (2009) pessimism seems to have been well-founded. Experts like him have suggested that schools should play an important role in battling inactivity (Brusseau et al., 2011; Fox et al., 2004; Institute of Medicine, 2013; Payne & Morrow, 2009). In addition, researchers have provided a steady stream of dire warnings about the effects of inactivity and resulting obesity on the health (e.g., see Ogden et al., 2012) and academic (e.g., Castelli et al., 2007; Efrat, 2011) progress of America's children and youth. Rather than work to help alleviate the problem, however, schools appear to have taken actions that have exacerbated it. For example, much evidence suggests that schools across the country are providing less rather than more physical education (Hardman, 2008; McKenzie & Lounsbery, 2009). Moreover, little evidence indicates that schools are expanding their extracurricular offerings beyond traditional team games or developing comprehensive school physical activity programs en masse, as advocated by some sport pedagogists (Castelli et al., 2014; Kelder et al., 2014).

More worryingly, and despite official condemnations of such actions by national organizations such as the National Association for Sport and Physical Education (NASPE, 2006a; an organization under AAHPERD, now SHAPE America), the practice of allowing children and youth to opt out of physical education altogether through waivers, exemptions, and substitutions (WES) appears to

be on the rise within school systems and districts across the country (NASPE, 2002, 2006a; NASPE & American Heart Association, 2012). Sometimes the WES for physical education are granted to children and youth who are participating in school sport or are thought to be physically active within other extracurricular options such as band, cheerleading, and Junior Reserve Officer Training Corps (Lounsbery et al., 2014; NASPE, 2002, 2006b, 2011). Alternatively, some WES are granted because children and youth are participating in physical activity outside of school (Kirk, 2002). Not surprisingly, research has suggested that the alternative activities in which exempted or waived students engage do not necessarily provide a level of physical activity that enhances health (Lounsbery et al., 2014). In addition, the children in schools that allow WES for physical education are more likely to be obese than those who attend schools that do not (Kim, 2012).

This study investigated the rationale behind and process of granting WES for physical education. The goals of the study were to describe the forms of WES; the degree to which administrators, teachers, students, and parents supported WES; and the factors that shaped the thinking of those individuals who advocated for WES. Although mostly descriptive, this study was not entirely atheoretical. Rather, it focused on how key stakeholders were socialized (George & Curtner-Smith, 2016, 2017, 2018) to think about physical education by various institutions, groups, societal biases, and traditions and how this thinking created space for, enabled, and promoted the use of WES.

Method

Participants and Setting

Participants came from three school districts in one state in which WES for physical education were permitted and prevalent. They included one state department official responsible for overseeing physical education, 10 physical education teachers, eight school principals, two school assistant principals, six students, and six parents. Principals and assistant principals were purposefully selected because they oversaw schools in which WES for physical education were frequently granted. Physical education teachers were

purposefully selected because they worked in schools that frequently granted WES. Students were purposefully selected because they had been granted WES or were eligible to request WES and had chosen not to. Finally, parents were purposefully selected because they had requested WES for their children or had specifically chosen not to make this request. Prior to participating in the study and in line with institutional review board requirements, all participants provided consent or assent and were given fictitious names to protect their identity.

Data Collection

The main source of data came from three types of interviewing. Formal interviews were carried out with the state department official, physical education teachers, principals, assistant principals, and parents. Shorter informal interviews were also carried out with the physical education teachers, principals, and parents. These took the form of conversations both in person and by telephone. Students were interviewed within two focus groups. Formal and focus group interviews were audio recorded and transcribed verbatim. Notes on the contents of informal interviews were made as soon after their completion as possible. Official documents on the subject of WES for physical education at the state, district, and school level served as a fourth source of data.

Data Analysis

Initially, data were separated into chunks that expressed or represented specific thoughts, ideas, views, and perspectives. The data chunks were coded and grouped into categories and the categories were collapsed into larger themes through techniques of analytic induction and constant comparison (Goetz & LeCompte, 1984). Trustworthiness and credibility of the analysis were enhanced through member checking, triangulation among and across participants and data collection techniques, and the search for discrepant and negative cases (Goetz & LeCompte, 1984).

Findings and Discussion

Three main themes emerged from the data. These were forms of WES, marginalization, and the privileging of physical activity.

Forms of WES

Three broad types of WES were found to operate within the school districts in which this study took place. These were participation in in-school activities in lieu of physical education, participation in out-of-school activities in lieu of physical education, and "innovative waivers."

Participation in In-School Activities in Lieu of Physical Education

This form of WES involved middle and high school students being exempted from participating in physical education because they were taking part in sport, physical activity, or "other approved activities" within their schools. Most of these activities were extracurricular in nature, although some, such as an apparently high level dance program run by an "outside instructor" in one middle school, took place during the school day:

> I just love [the dance program]. I wasn't sure at first, but my girl loves to dance. I'm a teacher and I know state standards; and, to me, it is important that those are addressed. When I saw the layout and saw how the program would work, I knew it work for her with dance . . . because of the quality of instruction. (Sharon, parent, formal interview)

Emily, the state official for physical education, noted that this form of WES had been in place for "some 20 years" in her state and shared the state's official list of activities for which students had been granted this type of WES. This list included many traditional extracurricular sports such as football, basketball, and softball. The activity for which most schools granted WES, however, was "marching band." Other activities included in the list were cheerleading, color guard, flag corp, majorette, and show choir.

To provide these WES for students, schools or school districts applied directly to the state's department of education for each in-school activity they wanted to "count" or they requested inclusion of their entire extracurricular sports program. These applications were supposed to go to Emily and be renewed every 2 years. In reality, however, Emily noted that the process was "political," that many schools failed to go through the renewal process, and that she was

often bypassed by principals and superintendents who were "connected" and went directly to the state superintendent. Moreover, once in-school activities were approved, the school was supposed to be responsible for ensuring that students participating in them met state standards for physical education. Evidence indicated, however, that school or district officials made little or no effort to verify this. For example, one high school principal, Mike, explained, "Let's face it. I don't have time to check in-depth."

Participation in Out-of-School Activities in Lieu of Physical Education

A second and more recent form of WES that had been in operation in some schools for approximately 3 years allowed parents to apply for the school physical education component to be waived for their children in lieu of their participating in activities outside of school. Again, this mainly applied to secondary students, most of whom were from middle-class backgrounds. This form of WES was less prevalent than those granted for in-school activities and involved approximately 20 children and youth throughout the state who attended seven schools.

To be granted this form of WES, a detailed application was generally made directly to the school and a 1-year plan divided into two semesters was agreed on by parents, the student, physical education teacher, counselor, and principal. Once approved, the plan was forwarded to curriculum and instruction administrators at the school district for final approval. This kind of WES was granted for activities such as dance, music, and competitive swimming, as well as for those who participated on an equestrian team or had a role as a camp counselor. Again, the theory was that students would meet the state's goals for physical education through participating in these activities and that the school would verify this. In one school, for example, this verification was to be achieved by both the principal and physical education teacher examining an activity schedule and activity log that had been supplied by the student and corroborated by the student's parents. Sometimes this evaluation was completed by reference to a rubric that focused on agreed performance evaluation criteria such as attendance, completing fitness testing, citizenship, ability and performance tasks, course of study standards, and being active for an hour each day. More often, the evaluation simply

involved checking that students had logged the 75 hours of activity that equated to 1 credit and that these hours had been confirmed by the signature of an observing adult. State policy documents also revealed that as well as including activities in which students participated during the semester for which they were exempted, this form of WES could be retroactive or proactive and apply to activities completed in the previous or following semester or summer.

One principal in favor of this form of WES illustrated its effect by referring to the experiences of one of her students who "took advantage" and substituted equestrian activities for physical education:

> She has to turn in her papers with the hours spent at the barn. She is up well before anyone else in her grade doing work. She practices before school and after. We know that. She is in competition many weekends and even misses school for them. We keep her documents for the sake of state reasons, but even without those, I know she is doing more than the required amount of time. She comes from a good family and they are going to do it right. (Kim, high school principal, informal interview)

Innovative Waivers

Innovative waivers were a much more recent option for individual schools or school districts and, at the time the study was completed, had been in operation for 2 years. They were designed by the state's department of education to give schools at all levels more flexibility in scheduling and budgeting than current policy permitted for the schools to achieve more advanced academic standards in English, mathematics, science, and social studies. In addition, one school district's official documentation suggested that the flexibility created by innovative waivers would provide "more opportunities [for high school students] to participate in career and technical education electives [and] advanced courses."

Schools opting into this system had to provide an approved innovative plan by which this could be achieved. Within this plan, they could limit the amount of physical education offered to a level below regular state standards and could increase physical education class sizes above normal state standards. This course of action was frequently taken at the elementary level as a strategy to provide time and

space for classroom teachers to hold data meetings with the principal. In secondary schools that had been granted innovative waivers, the main way in which physical education was adversely affected was an increase in the number of in- and out-of-school activities that could be substituted for the subject. For example, the innovative plan of one school district allowed students in two schools to take part in "athletics, marching band, summer camps/programs, and intense athletic training efforts like Red Cross lifeguard certification" in lieu of physical education.

As noted by Emily and some of the physical education teachers, this meant "that PE and other [non-academic] programs [got] the shaft and some [didn't] even exist":

> Our school is struggling right now. [As a result of the innovative plan] our classroom teachers have weekly data meetings which means we have larger and longer PE classes to accommodate all teachers meeting at once. But then we won't see those kids for another day or two. They justify the hours based on a two-week increment, not daily physical activity. I'm fighting it. (Pam, elementary physical education teacher, formal interview)

Moreover, the process for approval of innovative plans often relied on the "good ole boy system." When these plans included cutting physical education, they were "many times" approved without Emily's knowledge or consent.

Idiosyncratic Nature of WES

During the course of the study, it became apparent that each of the three forms of WES existed in some schools and not others. For example, innovative waivers were more likely to be in operation in academically struggling schools primarily attended by students from relatively low socioeconomic backgrounds. Conversely, WES that involved students participating in out-of-school activities in lieu of physical education were more likely to be granted to students from relatively high socioeconomic backgrounds. In addition, because WES that sanctioned participation in out-of-school activities were granted on an individual basis, students in the same class were and were not exempt from physical education. Moreover, where WES were utilized, there were variations in policy from school to school

or within the same school district. Collectively, this meant that the system created was nonuniform and idiosyncratic.

Marginalization

Two ways in which physical education was marginalized facilitated the implementation of all three forms of WES. These were the privileging of academic subjects over practical subjects and the privileging of competitive sport over physical education. Key stakeholders had been socialized into accepting both these forms of marginalization as "normal" and "how it's always been."

Privileging of Academic Subjects Over Practical Subjects

Reflecting mind–body dualism (Descartes, 1641/1984) in Western cultures and the consequent privileging of "academic" over "practical" subjects (Goodson, 1983), physical education was equated with recess and regarded as relatively unimportant compared with English, mathematics, science, and social studies by many parents, students, principals, and some physical education teachers. For example, several students explained that being exempted from physical education was advantageous as it enabled them to take more academic classes:

> I have heavy course load. I have doubled up on some classes in order to graduate with all the classes I want. Sure, I could just take it easy and do study hall or another elective. But, I need all the [advanced placement] classes, and without the extra block of time, it wouldn't be possible. (Mac, high school student, focus group)

This sentiment was shared by some of the students' principals. For example, Mike noted that "skipping PE for another [advanced placement] class looks good for us academically. The more successful students we have in [advanced placement], the better. Luckily, the waiver allows us to do that." In addition, Paul explained,

> I know kids should have PE every day. I know that. But right now, it isn't a priority. I must meet with my [classroom] teachers together [to discuss academic data], and combining classes for a longer PE time is the only way I can make that happen. Until our test scores improve, it will stay this way.

> I make my teachers take their kids to recess for 15 to 20 minutes. That makes up for the days they miss PE. (Paul, elementary school principal, formal interview)

Moreover, although the state's department of education clearly intended innovative plans and waivers to be used by schools in which students' scores on standardized academic tests were relatively low, this line of thinking meant that they were also adopted by some schools in which students were successful in "academic" subjects:

> I don't know why we do the [innovative] waiver. It's not like our kids are bad. Honestly, we are one of the better schools [academically] in the system. I think it's because Mr. Peterson just does what the other principals do. (Mark, elementary physical education teacher, informal interview)

Where physical education was obviously of low quality, this effect was amplified, the support for WES was stronger, and the number of WES appeared to be greater:

> I'm ashamed to admit it because it is partially my fault, I guess. The PE . . . program is basically nonexistent. So really, those students that substitute extracurricular activities for school PE are better off and really not missing anything too important. (Devin, assistant high school principal, formal interview)

> I want to be doing something. That is me. I hate sitting down, just being lazy and waiting for the time to pass. That is what my friends do in PE. They may walk around the gym. I would be miserable. They literally do nothing in PE. (Abby, high school student, focus group)

Conversely, where physical education was perceived to be of a higher quality and students thought they were "learning something useful," the effect was reduced, there appeared to be fewer WES, and support for such programs was considerably weaker:

> Sally swims. She has been doing it since she was three. She excels in swimming. However, I feel like she needs the

> [physical education] program to enrich her and allow her to explore other options beyond her specialty. If for some reason she stops swimming, I want her to have been exposed to other things. (Sandra, parent, formal interview)

Not surprisingly, some physical education teachers with a strong belief in the importance of their subject fought against the implementation of WES by trying to strategically redefine (Lacey, 1977) or overtly change their situations:

> I'm fighting and trying to make them realize how it could work well for all. I even have a mock schedule made up to show how data meetings could still be run with daily PE. It may be a lost cause, but I'm not giving up just yet. (Pam, elementary physical education teacher, informal interview)

Other physical education teachers who were similarly appalled by the implementation of WES in their schools, strategically complied (Etheridge, 1989) with their principals because they felt powerless and threatened:

> I don't like it one bit. But I'm new here and I won't complain. I want my job and don't want to jeopardize it. I just try to make it work. It's a scheduling nightmare and some grades do get better instruction than others; but then, the next week, the other grades have the advantage. I often forget what has been taught if I don't have it in front of me. (Betsy, elementary physical education teacher, formal interview)

Privileging of Competitive Sport Over Physical Education

The second form of marginalization that made it easier for stakeholders to accept and endorse WES for physical education involved the privileging of competitive school sport over the subject. For example, parents liked WES because these allowed their children to be "able to put extra hours into [sports] that [would] make [them] more successful." Furthermore, they explained that this state of affairs was a tradition that they fully supported:

> I knew once Mac was in high school, his days of PE were over. It's always like that. My oldest son never had PE. And

> I never had PE in high school either. His PE is specialized in his sport, just like everyone else that is an athlete. (John, parent, informal interview)

In addition, six secondary principals argued that allowing students to participate in one or two extracurricular sports in lieu of physical education was advantageous in that it ensured a more focused PE and greater skill development. These principals also noted that this arrangement had the positive side effect of keeping the athletes together so coaches had the opportunity to make their teams more competitive. Because, in their view, the primary purpose of extracurricular sport was to win, allowing "the athletes to sub PE for varsity athletics to focus on a specific sport . . . [made] sense":

> I think it's a good thing. Serious athletes that play competitive team or individual sports can capitalize on the opportunity. Not all schools allow it and I think it makes us look better. To focus on just one activity and master it will pay off in the end. (Kim, high school principal, formal interview)

> I think it's important to have [students] in varsity athletics. Off-season, they are working out. In-season, they are working on the game. The coaches do a good job. And they need the extra time together during the day. This time and the exemptions allow for uninterrupted practice time. (Scott, high school principal, formal interview)

Some physical education teachers who prioritized extracurricular sport over physical education held a similar view:

> Man, I like the new schedule [to accommodate the innovative plan]. Sure, those days [teaching elementary physical education] with long classes get a little crazy and hectic, but it's worth it when I have extra time to work on my game stuff. I even finish those days earlier and am able to go on to the high school and start practice during their last class. I like it. (Russ, elementary physical education teacher/high school coach, informal interview)

> I don't mind them missing the PE class. I have them for basketball. They'd rather be there and I'd rather teach basketball than the other curriculum. So I'm good with it. I never took PE either in high school. Just varsity athletics. So, it makes sense. (Andy, high school physical education teacher/coach, formal interview)

Many exempted students who classed themselves as athletes were also supportive of WES because of the extra practice time it gave them and because they could not see a reason for participating in general PE:

> My focus is on football and baseball. I don't feel like it is super important for me to be in PE. I want to play college ball, so that's really all I care about. I do football in the fall and baseball in the spring. I do both in the summer. (Jake, high school student, focus group)

Although in the minority, two principals and three parents were not so certain that focusing on one or two sports was such a good idea. In support of their physical education teachers' thinking, they were concerned that students who did so were at "a disadvantage because they [were] missing state standards":

> I like the fact that they can really focus on their sport, but I do know that they are missing components in . . . PE . . . that that one sport cannot teach. I don't like that. It's a catch-22. (Jeff, high school principal, formal interview)

> I want Suzie to be exposed to as much as she can. I do feel as though she is missing out on some things [in physical education] because of her participation in varsity athletics. I had a hard time deciding, but it's what all the other players were doing. I didn't want her to be the odd one out. I hope I don't regret it in a few years. If they win a state championship, it will be worth it. (Ingrid, parent, formal interview)

Privileging of Physical Activity

Another key factor that appeared to strengthen the argument in favor of WES was the elevation of health-related fitness (i.e., being physically active; McKenzie, 2007) over other more traditional objectives of physical education, such as skilled movement and affective and cognitive development (Beighle & Morrow, 2014; Pangrazi & Beighle, 2013). A large proportion of principals, students, and some physical education teachers seemed to reduce the goal of physical education to getting enough exercise, spending time in activity, and getting the physical activity hours required. With this being the only worthwhile goal of the subject in their eyes, it is little wonder that they did not regard the implementation of WES as problematic:

> My coaches are responsible for their athletes. I trust them to do a good job. No, I don't require or expect them to match the [state] standards [for physical education], but I do expect them to get the physical activity in. (Brett, high school principal, informal interview).

> We have kids that are lifeguards in the spring and summer. . . . They could use this as their [physical education] credit. But, they don't. I'm not really sure why. It could be because they don't really know they could do it, or it could just be because their friends take the class. I don't know. But I do know several that could opt out because of outside of school activities listed in the waiver. (Kay, high school principal, informal interview)

Most parents held views on this topic similar to those of their children's principals. For example, Gina explained, "I really don't think Katie [her daughter] is missing much [by being exempt from physical education]. She is probably getting more high-intensity activity than if she was in PE." A minority of parents, however, espoused an opposing view and, in congruence with the majority of physical education teachers, wanted their children to become well-rounded and believed that there was much more to physical education than participating in health-enhancing activity:

> We had the chance to let Alex skip out of PE. My husband and I talked, but we felt she needed to stay in the . . . course. Sure, she does more physical activity in her [swimming] lessons than she would at school, but we didn't want her to miss out on the lecture part of the [physical education] curriculum. I think it's important. And I hope she is learning something. (Minda, parent, formal interview)

Finally, in contrast to their parents, principals, and teachers, students who expressed opposition to the physical activity argument and WES did so on the basis that they were missing out on the socializing that occurred during physical education classes:

> I begged my mom to not sign the waiver. . . . I really wanted to stay in it because I could be with my friends. I dance every afternoon and night until like eight o'clock. Then I have to do my homework and study. So basically, PE is the only time I can hang out with my friends. I love it! (Lindsey, high school student, focus group)

Conclusion

This study illustrates that the policy of granting students WES for physical education has been firmly established in the educational system of the state in which it took place. Three forms of WES have been identified: WES that involved students participating in in-school activities in lieu of physical education, those that involved students participating in out-of-school activities in lieu of physical education, and innovative waivers that incorporated the first two forms of WES and gave administrators the power to curtail provision of the subject in terms of class size, lesson length, and frequency. Policy regarding WES varies across these schools and school districts, resulting in a nonuniform and idiosyncratic system. In congruence with past research (Lounsbery et al., 2014), this study shows that the schools lack accountability for what activities inside and outside of school can replace physical education, and many of the activities for which students receive permission to participate in lieu of physical education are of dubious quality. Moreover, scheduling changes based on

the granting of innovative waivers at the elementary level appear to have an adverse effect on the quality of physical education.

Several factors allow WES to evolve and thrive within the school system. These include the marginalization of physical education in relation to subjects labeled as "academic," and relative to competitive sport; the privileging of participation in physical activity over other objectives of the subject; and low quality physical education.

The majority of principals, parents, and students in the study supported the granting of WES for physical education. More worryingly, so did a minority of physical education teachers who, in Lawson's (1983a, 1983b) terms, regarded curricular physical education as a "career contingency" and were mainly interested in coaching. More encouragingly, a minority of principals, parents, and students, and the majority of physical education teachers and the state official responsible for physical education were opposed to WES for the subject or at least somewhat troubled by WES. This suggests that it is not too late to turn the tide.

First and foremost, the study's results suggest that this tide-turning can be accomplished through providing higher quality physical education in schools and showcasing these programs to parents. In addition, reemphasizing a balanced set of objectives for the subject, providing improved training for principals and other school administrators in terms of physical education, and adding accountability measures that make it difficult for coaching-focused teachers to remain in the profession would all help. Finally, a change of educational philosophy that returns to the idea of educating the whole child would obviously improve matters.

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PHYSICAL EDUCATION REQUIREMENTS

Credit Hour Comparisons Across Various Physical Education Teacher Education Institutions in the United States

Ashley Phelps and Xiaofen Keating

Abstract

The physical education teacher education (PETE) landscape is in need of adjusting the types of credit hours allocated within its programs. In doing so, preservice physical education teachers will be better equipped to take on the challenges of today's physical education milieu. PETE program credit hours have remained similar over the past 3 decades. That is, general education credits still outnumber physical education major credits. Colleges and universities appear to place more emphasis on general education, rather than on the specific content related to the physical education major. This study examined credit hour allocation leading up to and within PETE programs based on the 2018 Carnegie Classifications to understand how preservice physical education teachers are being prepared at different institutional levels. It also examined differences in general education credits and PETE major credits required for graduation. Analysis of variance, multivariate analysis of variance, descriptives, and a paired sample t test examined whether there were credit hour differences between content areas within the same institution and whether credit hours offered varied by institution. The results showed that general education credits outweighed PETE credits and that total required credit hours varied significantly by institutional type.

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It has been suggested that a quality physical education program can help children develop lifelong habitual involvement in physical activity (Chen et al., 2014; Dyson, 2014). Physical education, for example, has been shown to provide students up to 18% of their recommended daily physical activity of 60 min or more of moderate-to-vigorous physical activity each day (Morgan et al., 2007). Essentially, physical education has the potential to help students increase their physical activity levels and improve their overall health and fitness (Chen et al., 2014; Sallis et al., 2012). However, none of this health promotion or physical fitness knowledge would exist if it were not for a well-rounded physical educator (McKenzie & Lounsbery, 2013; Sallis et al., 2012).

Quality physical education teacher education (PETE) programs are of the utmost importance when it comes to shaping and preparing the physical educators of tomorrow (Ayers & Housner, 2008; Fletcher, 2016; Kim et al., 2015). To date, a number of studies have examined what quality PETE is. It may include adequate instructional time within the PETE major (Bahneman, 1996); sufficient time spent in field experiences, such as internships and student teaching (Curtner-Smith, 1996; Layne & Blasingame, 2018); an in-depth understanding of physical education teaching methods, content knowledge, and pedagogy (Ward et al., 2015); the inclusion of cultural diversity (Burden et al., 2004); and modern technology (Jones et al., 2017; Liu et al., 2018). Thus, it is important that preservice physical educators (PPE) are fully prepared to tackle public health issues (McKenzie & Lounsbery, 2014) and meet the national PETE standards (Hastie, 2017; SHAPE America, 2017; Taliaferro et al., 2017). This preparation begins during the teacher education phase of a person's occupational socialization (Richards et al., 2013; Romar & Frisk, 2017).

To better help us understand what quality PETE is, it is important to address the standards for PPE in the United States. The Council for the Accreditation of Educator Preparation (CAEP) took the place of the National Council for Accreditation of Teacher Education (CAEP, 2013). The CAEP aims to ensure that education preparation providers are delivering students with evidence-based instruction and provide five standards: (a) content and pedagogical knowledge; (b) clinical partnerships and practice; (c) candidate

quality, recruitment, and selectivity; (d) program impact; and (e) provider quality, continuous improvement, and capacity. These standards are overarching and have the ability to branch out into Specialized Professional Associations (SPA), such as physical education. The PETE SPA is SHAPE America (SHAPE America, 2017). Essentially, the 2017 SHAPE America national standards for beginning physical education teachers consist of the following elements: (a) content and foundational knowledge, (b) skillfulness and health-related fitness, (c) planning and implementation, (d) instructional delivery and management, (e) assessment of student learning, and (f) professional responsibilities. However, the way in which these standards are conveyed within PETE programs differs from institution to institution (Ayers & Housner, 2008; Kim et al., 2015).

As might be expected, PPE undergo various types of coursework in college. According to studies on the topic in the United States (Ayers & Housner, 2008; Bahneman, 1996; Hetland & Strand, 2010), there are three types of coursework included within undergraduate studies: general education courses, professional education courses, and PETE specialization courses (i.e., physical education subject content courses, teaching methods courses). Although the number of credit hours required within each subject area is dependent upon the university, a number of studies have suggested that more credit hours should be applied toward physical education content knowledge (Herold & Waring, 2017; Kim et al., 2015) and that field experiences should be embedded throughout the PETE program (LaMaster, 2001; Layne & Blasingame, 2018). In addition, a handful of studies have suggested including cultural diversity (Burden et al., 2004) and instructional technology (Jones et al., 2017; Liu et al., 2018) training within PETE programs. To date, however, it is unclear if more PETE credit hours have been offered within PETE programs to meet new public health challenges.

University core curriculums—also known as general education requirements—help to prepare an undergraduate student for life beyond graduation. Some general education courses may include English, math, religion, liberal arts, humanities, and science. Typically, a student takes these courses prior to entering their major or these are woven throughout the undergraduate curricula (Young et al., 2018). Professional education courses (i.e., introduction to

teaching in education, students with disabilities in the classroom) are related to general teaching and learning practices in schools. Major credit hours are taken within the PETE major. PETE courses include subject matter content knowledge (activity courses such as swimming, basketball, football; Herold & Waring, 2017; Kim et al., 2015; Ward et al., 2015) and pedagogical content knowledge (K–12 internships and student teaching experiences; Ward et al., 2015). Embedded in the pedagogical content knowledge courses are field experiences. These content knowledge and pedagogical content knowledge credits make up a portion of the major credit hours offered within PETE programs (LaMaster, 2001) and serve as the cornerstone for PETE programs by providing PPE with the opportunity to practice their teaching methods under guided and controlled experiences with cooperating teachers and field supervisors in elementary and secondary settings. In general, field experiences and physical education content courses can be formative aspects of PPE training (Curtner-Smith, 1996; Layne & Blasingame, 2018). Total credit hours are the number of credit hours required for graduation.

It is important to point out that general education credits, major credits, field experience credits, and total credits differ from institution to institution according to the 2018 Carnegie Classifications (see carnegieclassifications.iu.edu). Some programs may require more general education credit hours than others. This requirement may affect the total number of credit hours required for graduation and thus may take away from the courses dedicated to the PETE major. The quality of PPE preparation could be better understood with an analysis of the credit hours requirements for PPE (Strand, 1992). As such, an examination of research on this credit hour topic could shed new light on this study.

Research on Physical Education Teacher Education Program Credit Hours and Course Content

Strand (1992) examined 131 PETE programs, using a 21-item questionnaire that focused on programmatic experiences in PETE. Strand found that 6% of those PETE programs required their students to take all of their skill courses prior to their junior year. It was also discovered that weight training was the number one class taught in secondary schools, yet only 3% of the 131 PETE programs

included in the study taught weight training concepts to its PPE. In the same vein, 103 physical education practitioners were surveyed about their content knowledge, pedagogical content knowledge, and professional knowledge taught within their PETE programs (Collier & Hebert, 2004). Movement education and skill feedback were the two areas that physical educators wished they had learned more about. According to this study, future physical educators were not adequately prepared to deal with behavioral problems, nor were they exposed to diverse teaching settings or practicum experiences. This study helped to kickstart the realization as to whether PETE programs were preparing PPE in a consequential, comprehensive, and cohesive manner (Collier & Hebert, 2004). Along with these realizations, the adequacy of university coursework within PETE programs has also been examined.

Hill and Brodin (2004) investigated 132 physical education teachers who had approximately 15 years of teaching experience. They asked the participants about their undergraduate coursework and the value it had toward what they learned in their PETE program. The participants were also asked about any teaching difficulties encountered during their first year as a physical educator. Access to adequate facilities and equipment, student discipline, catering to students with special needs, and scheduled interruptions were the top four perceived areas of difficulty during the induction year. Hill and Brodin also reported that sport skills knowledge and student teaching experiences were the most valuable concepts that former PETE students took away from their PETE program.

To the best of our knowledge, three existing studies have specifically examined courses and credits related to PETE programs in 1996 (i.e., Bahneman), 2008 (i.e., Ayers & Housner), and 2010 (i.e., Hetland & Strand), respectively. Bahneman (1996) examined differences and similarities in curricular elements by surveying 47 institutions and examined the collection of programmatic purposes and requirements from each institution. The author reported that general institution requirements included written and oral communication, math, computer science, humanities, social and behavioral sciences, and physical and biological sciences. The mean credit hours for these general education requirements was 69.1, whereas the physical education major credit hour requirement was 28.8.

Bahneman found that PE major credit hours did not even make up half of the general education credit hours required for graduation. Similarly, in a descriptive analysis of undergraduate PETE programs, Ayers and Housner (2008) investigated 116 institutions throughout the United States by administering a comprehensive questionnaire. Respondents were asked about the characteristics of their undergraduate PETE programs based on the 2006 Carnegie Classifications. Total credit hours required ranged from 120 to 156, with PE major credits averaging at 54.57. This contrast speaks to the notion that general education credit hours occupy a majority of an undergraduate curriculum. "On average, only 9.61 credits are allocated to what teachers will be expected to teach in K–12 programs in a 130-credit-hour program" (Ayers & Housner, 2008, p. 61).

In 2010, Hetland and Strand also used a self-designed survey to analyze PETE programs in SHAPE America's central district (i.e., Colorado, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and Wyoming). Similar results were reported given that the authors found the average total number of credit hours required for graduation was 122.70. Average credit hours for physical education content knowledge courses was 8.93. Field experience credit hours ranged from 8.14 to 27.11. Although a handful of studies on credit hour distribution have been published, it is unclear to what degree the distribution of credit hours differs from institution to institution. Furthermore, it has been 10 years since the last study on this topic was published. During this time, the new physical education teaching standards were published. Therefore, it is important that we gain new knowledge about the preparation of PPE. Specifically, we explore credit hour differences by institutional types according to the 2018 Carnegie Classifications. These classifications will help provide a background on how and why colleges and universities differ.

Carnegie Classifications

The Carnegie Classifications of Institutions of Higher Education is a framework that classifies colleges and universities across the United States. This framework helps to serve both educational purposes and research-intensive purposes (i.e., identifying groups of somewhat comparable institutions). The 2018 Carnegie Classifications highlights six types of institutions: doctoral universities, master's colleges

and universities, baccalaureate colleges, associate's colleges, special focus institutions, and tribal colleges. For the purposes of this study, PETE institutions were classified utilizing the 2018 Carnegie Classifications as follows: (a) doctoral universities, (b) large master's colleges and universities, (c) medium/small master's colleges and universities, and (d) baccalaureate colleges. In the United States, doctoral institutions make up 9.6% of universities (n = 418), whereas master's colleges and universities comprise 15.8% of institutions (n = 682) and baccalaureate colleges make up 19.5% of the country's institutions (n = 838). Associate's colleges, special focus institutions, and tribal colleges were not included in this study due to differences in educational objectives. Doctoral institutions consist of three types and are classified as Very High Research Activity, High Research Activity, and Doctoral/Professional institutions. Master's colleges and universities are classified into three types: Large, Medium, and Small programs. Baccalaureate colleges consist of Arts and Sciences, Diverse Fields, Mixed Baccalaureate/Associate, and Associate's Dominant institutions. However, for the purposes of this study, Arts and Sciences and Diverse Fields schools were examined.

Table 1 shows a breakdown on the Carnegie Classifications in this study. It is imperative to understand these differences across institutions, as they may affect the structure of PETE programs, especially from a content and pedagogical perspective (Liu et al., 2018). For example, the highest research activity is carried out by Very High Doctoral Research Activity institutions. Therefore, the credit hours offered may revolve around research that has been conducted in the field, resulting in differences in major credits or field experiences credits. Baccalaureate colleges may lack credit hours on research-intensive pedagogy when compared to their doctoral counterparts. Hence, it is critical that we examine the current curricula of PETE programs by credit hours in the United States to ensure that PPE are being provided with the education necessary to carry out their own quality physical education program. As a result, this study examined PETE program credit hour allocation in comparison to general education credits. An emphasis was placed on field experience credit hours in PETE programs due to the experiential importance in the quality of PPE (Curtner-Smith, 1996; Layne & Blasingame, 2018). This study also examined differences in PETE program credit hours

by institution based on the Carnegie Classifications. Our hypotheses were as follows: (a) There is a significant difference between general education credit hours and major credit hours required across all PETE programs; (b) the number of institutional credit hours for graduation varies significantly according to the Carnegie Classifications; and (c) major credit hours and field experience credit hours differ significantly by institutional types. It is hoped that this study will provide baseline data to help improve the quality of PPE preparation, especially in this culturally diverse and technologically advanced era.

Table 1
Carnegie Classifications of Universities and Colleges in the United States

Types	Doctoral universities	Master's colleges and universities	Baccalaureate colleges
Levels	Very High Research Activity	M1: Larger Programs	Arts and Sciences Focus
	High Research Activity	M2: Medium Programs	Diverse Fields
	Doctoral/ Professional Universities	M3: Smaller Programs	
Criterion	Award 20 or more doctoral degrees or 30 or more professional practice doctoral degrees [a]	Award 50 or more master's degrees, but fewer than 20 doctoral degrees [a]	At least half of the degrees offered are bachelor's degrees [a]

[a] Number of degrees awarded per year.

Method

Selection of PETE Programs

There are approximately 503 PETE programs in the United States. Of those, 391 award undergraduate degrees and 112 award graduate degrees. For the purposes of this study, 322 (more than 50%) PETE

programs were randomly selected using the Peterson's school index (see https://www.petersons.com/). Colleges and universities with undergraduate PETE programs were identified through a lottery procedure that drew on well-mixed numbers (Collins, 2010). Once randomly selected, schools were categorized into their Carnegie Classifications. Selection criteria for each institution with a PETE program were twofold: (a) The PETE program had to offer an undergraduate degree and (b) the undergraduate degree had to include a K–12 teaching license emphasis. Thus, only undergraduate PETE curricula were included in this study.

Following the identification and categorization of these programs, PETE curriculum guides, graduation checklists, course listings, program websites, and academic catalogs were located within the search engines of the colleges and universities and coded according to the number of general education, major, field experience, and total credit hours offered. Curricula for 83 doctoral universities, 168 master's colleges and universities, and 71 baccalaureate colleges were included. Master's colleges and universities were split into two groups based on sample size. Specifically, large master's programs made up one group and medium/small master's programs were combined as the other group. This split ensured similar sample sizes across institutional type. As a result, four types of institutional programs were analyzed. Because no human subjects were involved in this study, no institutional review board approval was needed. The data collected for this study were for descriptive and statistical purposes only.

Data Collection

We used a secondary data analysis research design for this study. For this study, we used information that had already been collected and made electronically available by PETE programs, to attempt to answer the research questions. A coding sheet was developed to differentiate between the types of institutions and the credit hours offered within each curricular category across those institutions. It is important to note that major credit hours usually comprises both field experience credits and other physical education course credits. We separated field experience credit hours from PETE major credit hours. Therefore, we compared the field experience credit hours to

the PETE major credit hours (i.e., methods, technology, assessment, adapted, measurement courses in PETE). Classification of content of electives was difficult since those credits varied by each student, rather than by PETE program. As a result, only required credit hours were coded. Intercoder reliability took place when Xiaofen Keating randomly code 20% of the selected programs. The percentage of agreement between the two coders was calculated and the agreement was greater than 80%, which is the cutoff value for acceptable intercoder reliability (Meyers et al., 2017). Peer debriefing was also used as a cross-check to the coding of the credit hour variables and the number of credit hours offered; this ensured error-free coding in the curriculum analysis phase of the study. Discrepencies between the codes were discussed and rechecked one last time.

Data Analyses

Once all data were coded, cross-checked, and verified, descriptive statistics were performed first, followed by a paired-sample *t* test for the first hypothesis: There is a significant difference between general education credit hours and major credit hours required across all PETE programs. A multivariate analysis of variance (MANOVA) was also used in the examination of variations in noncombined variables (i.e., general education credits, major credits, and field experience credits) offered within and across PETE programs (Meyers et al., 2017). Because MANOVA requires variables to be independent from each other, whereas total credit hours were the sum of general education credits and major credits, an analysis of variance (ANOVA) was performed for differences in total credit hours across the Carnegie Classifications. A post hoc test was performed for a significant ANOVA test, identifying which groups resulted in differences. Effect sizes were calculated for all significant tests. Specifically, Cohen's *d* was computed for the paired-sample *t* test and partial eta-squared was employed for the ANOVA. Cohen (1988) suggested a *d* of 0.2 as a small effect size, 0.5 as a medium effect size, and 0.8 as a large effect size. All data analyses were completed through SPSS version 25.0. A *p* value of less than .05 indicates a significant difference (Meyers et al., 2017).

Results

Description of Mean Credit Hours for General Education, Major, Field Experience, and Total Credits

Excluding elective credit hours, mean general education credit hours of 45.06 (*SD* = 8.79) outweighed the mean of major credit hours at 34.99 (*SD* = 11.17), indicating that students take more general education credits than they do credits in their PETE major (see Table 2). This also means that the first two years of an undergraduate's PETE trajectory is mainly devoted to content other than physical education–related coursework.

Table 2
PETE Credit Hours

Credit hours	*M*	*SD*	*f*
General education	45.06	8.79	36 (42)
Major (excluding field experience)	34.99	11.17	19 (32)
Field experiences	10.89	4.33	118 (12)
Total	122.77	10.29	119 (120)

Mean field experience credit hours totaled to 10.89 (*SD* = 4.33), whereas mean total credit hours required for graduation was 122.77 (*SD* = 10.29). The mode (i.e., most frequent number) of general education credits required was 42 (appearing 36 times), whereas the mode of major credits required was 32 (appearing 19 times). The mode of field experience credits required was 12 (appearing 118 times). The mode of total credit hours for graduation was 120 (appearing 119 times). Table 3 shows the mean credit hours within PETE programs based on the Carnegie Classifications.

Differences in Mean Credit Hours for General Education, Major, Field Experience, and Total Credits

Our first hypothesis was confirmed, considering that the paired sample *t* test result revealed that the difference between general education credit hours and major credit hours was statistically significant at the specified .001 level, $t(321) = 12.44$, $p = .000$, ES = .693. For our second hypothesis, the difference in total credit

Table 3
Credit Hours Based on the Carnegie Classifications

Institution type	Mean credit hours			
	General education*	Major*	Field experiences	Total
Doctoral	44.07	33.90	11.34	122.09
Large Master's	46.00	35.13	11.07	121.08*
Medium and Small Master's	44.62	34.93	10.93	125.69*
Baccalaureate	45.29	36.09	10.07	123.28

* $p < .05$.

hours required for graduation across institutional levels (i.e., doctoral, large master's, medium/small master's, and baccalaureate), the ANOVA test result was statistically significant between large master's colleges and universities and medium/small master's colleges and universities, $F(3, 318) = 2.91$, $p = .035$, ES = .027. The post hoc test results indicated differences in two types of colleges and universities: (a) doctoral universities had more total credits than medium/small masters' colleges and universities, and (b) large master's colleges and universities also had more total credit hours that medium/small colleges and universities. However, the MANOVA result did not support our third hypothesis for whether there were significant differences in general education credits, major credits, and field experience credits across institutions according to the Carnegie Classifications.

Discussion

It has been widely acknowledged that the way in which PPE are taught plays a critical role in the quality of physical education as they are trained to become the future workforce for our profession (Ayers & Housner, 2008; Bahneman, 1996; Chen et al., 2014; Curran & Standage, 2017; Sallis et al., 2012). Although various factors may affect the quality of PPE preparation, the centerpiece to determining such quality is the training PPE receive in their PETE program, which is mainly done through coursework and field experiences (Ayers & Housner, 2008; Bahneman, 1996). However, to the best of our knowledge, few studies have explored the professional preparation of PPE measured by credit hours within PETE programs of varying levels of the Carnegie Classifications. More importantly,

new technology and student diversity have jointly changed the landscape in which physical education is taught and learned in schools (Koekoek & van Hilvoorde, 2018; Sargent, 2018; Hill et al., 2018). As a result, PETE programs need to meet the new demands of PPE preparation to better help K–12 schools combat childhood obesity and the propensity of physical inactivity. Without an adequate number of credit hours within PETE programs, it is impossible for physical education field to ensure the quality of PPE. This strand of research warrants more attention from professionals in our field.

As noted, the purposes of this study were twofold: (a) examine credit hour differences in general education credits and major credits within PETE programs and (b) explore credit hour variations of general education, major, field experience, and total credits required by PETE programs based on the 2018 Carnegie Classifications. Our study contributes to our understanding concerning PPE preparation by identifying the types of coursework and the amount of credit hours included in and outside of PETE programs based on the type of university or college in which the degree is offered. This was done using a large sample size across the United States. The findings reported in this study could allow for better design of future PETE curricula that align with the needs of quality physical education in K–12 programs. Specifically, three results from this study are worth noting. First, one finding of our study aligns with three studies (Ayers & Housner, 2008; Bahneman, 1996; Hetland & Strand, 2010) in that differences in general education credits and major credits were statistically significant. Second, there were no differences in major credits and field experience credits by the type of institution. Third, the only significant credit difference across institutions lies in the total number of credit hours required for graduation between large master's colleges and universities and medium/small master's colleges and universities.

General Education Versus Major Credits and Total Credits

PETE programs varied significantly in their general education and major credit hour requirements, and total credit hour requirements also varied significantly across large master's colleges and universities and medium/small master's colleges and universities. It is unclear how these differences affect the quality of program

graduates. It is apparent, however, that general education credits outnumber major credits across institutions, regardless of their Carnegie Classifications, which aligns with what has been reported in the literature (e.g., Ayers & Housner, 2008; Bahneman, 1996; Hetland & Strand, 2010). More alarmingly, the consistent finding on the difference between general education and physical education major credit hours is a cause for concern as it indicates that PPE only have approximately 1.5 to 2 years of study in their discipline to become a qualified physical education teacher. These findings are consistent with the results found by Ayers and Housner (2008) in that PETE majors were averaging only 1 to 2 years in their educational program.

It is surprising that an increase in major credit hours within PETE and a decrease in general education credit hours have not occurred, even after a number of researchers have implied the importance of reallocating credit hours toward the PETE major (Hetland & Strand, 2010; Siedentop, 1990, 2002). Although it is not easy for PETE programs to readjust the number of credit hours offered, steps can be taken through educational policy change. The results found in this study may explain why previous studies have pointed out that physical education teachers are not well prepared to effectively teach physical education in schools (Hill & Brodin, 2004; McKenzie & Lounsbery, 2013, 2014; Phillips & Marston, 2008).

Although it is still unclear what cut-point for general education credit hours is reasonable, PETE programs should consider restructuring the number of credit hours offered in the physical education major. A possible idea may be transferring the imbalance of credits required for general education courses into the PETE program; again, such a change would have to account for the educational policies of the institution. These findings call for the reorganization of undergraduate PETE programs. Future research could explore the emergence of diversity courses and technology courses to expand the traditional role of physical education teachers, which makes it necessary for PETE programs to provide authentic, contextually diverse opportunities for PPE (McMullen et al., 2014). Sparing general education credits and ramping up field experiences may be a plausible solution to developing more well-rounded physical educators.

Major and Field Experience Credits Across the Carnegie Classifications

Field experiences provide PPE with practical exposure to multiple PE classes in school districts surrounding their college or university. Student teaching makes up an important part of the PETE curricula and is considered the pinnacle field experience (Gao et al., 2014; Hushman, 2013; Jones et al., 2017; Syrmpas & Digelidis, 2014). However, it is surprising that no significant differences were found in PE major credits and field experience credits by the type of institution. Furthermore, although 3 decades worth of attention has been given to field experiences embedded within PETE programs (e.g., Belka, 1988; Curtner-Smith, 1996; LaMaster, 2001; Layne & Blasingame, 2018; O'Sullivan & Tsangaridou, 1992), the average number of credit hours for field experiences was about the same as that reported in other studies (i.e., 9.61 credit hours, Ayers & Housner, 2008; 8.14 credit hours, Hetland & Strand, 2010). In essence, no significant changes have occurred within PETE programs over the past 3 decades. This is a cause for concern as the rise in childhood obesity has gone up exponentially (Ludwig, 2018).

Differences in Total Credits Required for Graduation Across the Carnegie Classifications

The significant difference in total credit hours by the type of institution indicates that large master's PETE programs have fewer electives, given that no differences were found in the general education, major, and field experience credit hours. Generally speaking, electives are used to meet individual needs, because each student has unique previous knowledge and experiences related to their program of study. More elective credit hours usually indicate more personalized program elements. Unfortunately, no data are available to explain why universities and colleges with large master's PETE programs have the smallest number of elective hours than other types of institutions. This is because our study was the first to attempt to analyze all credit hours required for graduation from a PETE program, using the 2018 Carnegie Classifications.

Although this study is the first to examine PETE undergraduate credit hour differences across institutions, using the 2018 Carnegie Classifications, a couple limitations should be addressed. First, the

information related to PETE credit hours was obtained by searching the website of each selected university or college. It is possible that some universities or colleges may be behind in updating their website, resulting in data collection errors. Cautions need to be exercised when interpreting the results of this study. Second, not all course descriptions within each PETE curriculum are known. Therefore, it was difficult to assess the quality of the PETE programs in this study. Experimental studies need to examine the quality of PPE by allocating more content to the physical education major and seeing whether additional content helps to prepare PPE for teaching quality physical education beyond graduation. By addressing this gap in the literature, researchers may be able to determine what PETE content affects their students' future teaching endeavors the most.

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SPORT MANAGEMENT

Sport Academies in Schools: Examining Their Rise in Popularity

Douglas Leong and David Chorney

Abstract

This paper looks at the increasing number school sports academies in Edmonton, Alberta, Canada. An examination of the information available via literature and public school websites shows that the number of school sports academies grew from two schools in 2005 to 30 schools in 2018. There are 12 sport specializations offered across the 30 schools, with ice hockey available at 22 of the schools. This growth in the number of school sports academies can be traced back to the Province of Alberta's Alternative Programs policy, which allows school districts to develop local courses that cater to the needs of their students, and the principle of opening the boundaries between school boards and schools throughout the province. The opening of the boundaries has allowed students and their parents to choose where they want to attend school anywhere in Alberta (student mobility), including the option of a school that offers a school sports academy program as an alternative to the regular physical education program.

A number of public schools at all levels (primary, middle, and secondary) in Edmonton, Alberta, Canada, offer a school sports academy (SSA) alternative in place of the regular physical education (PE) program to students. The number of SSAs grew from two schools in 2005 to 30 schools in 2018, which represents approximately 7.5% of the 398 schools in Edmonton. This paper looks at some of the factors that have contributed to this growth in the number of

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SSAs. The term "regular" for the purposes of this paper refers to the PE program that would be offered to all students in that school.

Participation in sports at school can affect a student's personal growth (Pope, 2002). School sports participation influences students' personal health (Beets & Pitetti, 2005), improves their understanding of the importance of physical activity (PA), increases their self-confidence and self-esteem, and helps in their social and cognitive development (Bailey et al., 2009). School sports participation also enriches the school community and provides students a range of different learning experiences to "learn about themselves" (Pope, 2002, p. 91). The World Health Organization asserted that sports participation improves self-esteem, self-perception, and psychological well-being and in a Council of Europe report stressed the important contribution that sport makes to processes of personality development (Svoboda, 1994). There are also the negative aspects of sport participation. Grupe and Kruger (as cited in Pope, 2002) observed that sports participation can give rise to less desirable attributes such as being too competitive, being discriminatory, putting too much emphasis on winning, and being too violent. Plus, there is also little to no empirical data to support the notion that sport builds character, even though it is known that young people value participation in sport (Clough et al., 1993). Considering the pros and cons of sports being taught in schools, Gilroy (as cited in Pope, 2002) believes that the positive aspects can overcome the negatives if the sport is taught properly in a caring and safe environment that is "guarded from the perils of many adult agendas" (p. 91).

Current PE programs are important in providing and influencing the physical literacy (PL) and PA patterns that students need to live a healthier life (Bailey et al., 2009; Beets & Pitetti, 2005; Roetert & MacDonald, 2015). PL is the ability of a person to move with competence and confidence in a variety of physical activities in multiple environments that benefit the healthy development of the whole person (Lundvall, 2015). The development of PL is important for every individual (young and old), because it is related to the holistic nature of a person, the importance of their relationship to the environment in which they live, and the role of movement in the development of both cognitive functions and sense of self (Jurbala, 2015). Way et al. (2010) wrote in their Canadian Sport Policy report that PL is

recognized as "a precondition for the lifelong participation in, and enjoyment of sport" (p. 7). Way et al. added that the development of PL begins during childhood and improves throughout the child's early years of growth. Jurbala (2015) stated that the development of PL is characterized as the attainment of a lengthy list of locomotor, object control, and balance skills, without which "a child will have difficulty participating in any sport" (p. 370). Jurbala also contended that individuals are considered physically literate if they can perform the fundamental sports skills for the four basic environments of land, air, water, and ice. Further, Jurbala said that a physically literate individual moves with poise, economy, and confidence in a wide variety of physically challenging environments while applying intelligence and imagination.

PA is vital in enhancing the health and well-being of children and can help in the prevention of obesity (Goran et al., 1999; Janssen & LeBlanc, 2010) and of a future sedentary lifestyle that may lead to problems as an adult. Quality of life in later years can be influenced by PA patterns that are established in childhood and adolescence (Humbert, 2006). Ratey and Hagerman (2008) studied the effect of PA in optimizing brain function, in their 2003 study on a junior high school in Naperville, Illinois. The Naperville PA program stressed a variety of physical activities that were physically strenuous for the students (Sattelmair & Ratey, 2009). Ratey determined that there is a link between type of PA and academic performance (Tedx Talks, 2012), as Naperville students were scoring significantly higher than the national average in the Trends in International Mathematics and Science Study (TIMMS) test. PE4life, which was based on the Naperville PA program, implemented the PE4life program around the United States and also saw positive results. In a school in Titusville, Pennsylvania, the PE4life program implementation saw increased performance in standardized tests in reading and math from below state average to above state average by 17% and 18%, respectively (Sattelmair & Ratey, 2009). In an elementary school in Kansas City, Missouri, PE4life program implementation resulted in a reduced number of students on academic probation and improved literacy, plus a 67% drop in suspensions from the previous year (Sattelmair & Ratey, 2009). On the basis of their study, Ratey believes the type of PA can influence student academic performance

and behaviors (Tedx Talks, 2012). PA prepares the brain to learn. Ratey called PA "learning readiness" and contended that a side effect of PA is being healthy and that more schools should value the idea of preparing students for the "learning readiness" state (Tedx Talks, 2012).

For some students, there is a gap in what they want from PE class and what they experience in a PE class (Humbert, 2006). An SSA program as an alternative for the regular PE program can close the gap for students. If designed properly, an SSA program can provide the equivalent amount of PA and PL as a regular PE program. Grant and Pope (2007) felt that many of the fundamental skills taught in PE can be best expressed through sport along with teaching positive values about competition such as sportsmanship, fair play, teamwork, communication, and respect for others.

The benefits of teaching sport at school in place of a regular PE program are not supported by some scholars. Penney and Jess (2004) proposed that a futures-oriented PE program be developed through the activities that students will participate in as adults. They contended that it creates a better link to measure the importance of PE being taught in schools. An SSA program, where students are learning skills specific to a particular sport, would not be supported by Penney and Jess, because it does not prepare students for future life-related activities. Their view is that sports have been prioritized over focusing on which activities are best suited for the students. Jurbala (2015) would also not be in favor of an SSA that focuses on one sport, such as an ice hockey academy. Individuals would become very good on the ice, but what about their PL in the water or in the air? Roetert and MacDonald (2015) contended that PL is a lifelong process and that "physical literacy necessitates teaching a broad spectrum of movement activities from multiple categories and not relying on a sport model that appeals to only the highly skilled and competitive students" (p. 112). Lundvall (2015) pointed out that teaching movement for a specific sport does not lead to PL and that focusing on one sport equates to teaching a "single skill perspective" (p. 115). Therefore, Lundvall is not in favor of a sport teaching model, as sport is often associated with competition between children and/or adolescents, whereas PL is aimed at personal development and realization of individual potential.

SSAs in Alberta "come in all shapes and sizes and focus on different sports" (Balderson, 2015, p. 28). Some SSAs have been established to become centers for excellence to develop future elite athletes and still other SSAs have been created through a grassroots effort to meet the needs of the local population or school (Balderson, 2015; Pope, 2002).

As a person who has grown up with an interest in elite level sports, I (Douglas Leong) have always thought of the sports academy as a training center for highly athletically gifted individuals to train to become elite level athletes. My perspective goes back to the Cold War era when Eastern Bloc countries such as East Germany and the Soviet Union were seen as leading the way in developing sporting excellence based upon the number of medals that they had won at the Olympic Games from 1952 to 1988 (Green & Oakley, 2001). These two and other communist countries used sport and sporting success to achieve a measure of recognition and prestige over the West (Riordan, 2002). In an effort to keep up the Eastern Bloc countries in respect to Olympic medals won, Western nations began to take the development of sporting excellence more seriously and started to establish their own centers of excellence to copy what was happening in the Eastern Bloc countries (Green & Oakley, 2001). Canada adopted sports policies that were similar to the Soviet model (Houlihan, 1997) and, in 2002 through the Canadian Sport Policy report, called for the establishment of a Long-Term Athlete Development model, which laid the groundwork in the establishment of centers of excellence for elite athlete development throughout the country (Government of Canada, 2002).

The World Academy of Sport based in Manchester, England, is another example of an organization that focuses on creating centers of excellence for elite athlete development. The World Academy of Sport has partnered with International Baccalaureate schools throughout the world to create the highest possible quality of education for competitive (elite) athletes. The World Academy of Sport offers the Athlete Friendly Education Centre accreditation to schools that demonstrate support to their student athletes in achieving their education and athletic goals. Currently, 21 schools around the world have this accreditation.[1]

[1] https://www.worldacademysport.com/?view=sp&sp_sec=AFEC

In Alberta, the first two schools that focused on being centers of excellence were the National Sport School, founded in 1994, and the Edge School for Athletes, founded in 1999. These schools provided a flexible academic schedule for students who wanted to train during the school year. These two early provincial SSAs would not have been possible without the implementation of the Province of Alberta's Alternative Programs policy in 1988. This policy allowed local school boards to develop programs to cater to the needs of students who wished to pursue excellence in sport and academics (Way et al., 2010).

Elite athletes may also be drawn to SSAs because they get training time during school hours (Pope, 2002). Ericsson et al. (1993) argued that it takes approximately 10 years of training or 10,000 hr of deliberate practice to reach an elite level of performance. Because many of the training hours take place during the years that students are attending secondary school (Way et al., 2010), attending an SSA is one way that students get those training hours in. This seems to be a win-win situation for elite level athletes, but research has found that the link between deliberate practice and elite performance is not as strong as Ericsson et al. (1993) showed it to be (Macnamara et al., 2014).

Pope (2002) provided an example of a New Zealand SSA that was established as a grassroots effort focused on a local need. In place of the regular PE program, the SSA program focused on the sport of rugby at Aranui High School. The academy was created "as the hook to raise students' motivation and adjust their personal aspirations, particularly toward their vocational goals" (Pope, 2002, p. 94). The Aranui High School case study showed that if an SSA program could interest the students in sport, it could get them to focus on academics. The case study also showed that an SSA program is a viable alternative to the regular PE program for students. At the grassroots level, other reasons for local school boards to create a school sports academy include to increase enrollment, to retain students, to increase student and teacher engagement, and to provide parents an alternative choice of schooling for their children (Balderson, 2015).

In Alberta, the SSAs established to focus on elite athlete development and those established based on a local need can be distinguished by the types of students they attract and by the amount tuition fees

charged (Balderson, 2015). The elite development SSAs charge higher tuition fees[2] and draw students from outside their established school boundary area. The higher tuition fees go toward payment of coaching, scholarships, room, students' room and board, food, and all athletic-related travel. The goal of the students who attend elite SSAs is to earn a postsecondary scholarship (Balderson, 2015). The academies that are not focused on elite athlete development tend to focus more on individual skill development and have lower tuition costs[3] (Balderson, 2015). Students who attend the nonelite SSAs are usually from within the school's established boundary area.

Two provincial initiatives have allowed for the establishment of SSAs and their growing popularity. First, the province's Alternative Programs policy[4] allows local school boards to offer alternative educational programs if they determine there is sufficient demand. The Alternative Programs policy, therefore, provides the flexibility for schools to offer the SSA program as an alternative to a regular PE program to their students. The regular PE program must be offered to those who do not want to enroll in the alternative program. The second initiative was a change to the Alberta's School Act[5] in 1988. This change opened the boundaries between school boards and schools, therefore allowing for student mobility and for students and parents to choose a school that best meets their needs (Taylor & Mackay, 2008; Wagner, 1999).

Edmonton, Alberta, Canada

Edmonton, Alberta, is located in Western Canada with a metropolitan population of 1.3 million and is Canada's sixth largest metropolitan region (Statistics Canada, 2017). Edmonton's River Valley park system is Canada's largest urban park with more than 160 km of maintained pathways, along with 20 major parks along the route (City of Edmonton, n.d.). Edmonton is known for its ice hockey team, the Edmonton Oilers Hockey club, and for one of the largest shopping malls in the world, West Edmonton Mall.

A normal school year in Alberta stretches over 10 months beginning in September and ending in June. Students in Edmonton

[2] Range from $15,000 to $30,000 CAD

[3] Range from $500 to $1,500 CAD

[4] https://www.alberta.ca/alternative-education-programs.aspx

[5] http://canlii.ca/t/53r8r

receive 950 instructional hours at the elementary and junior high school levels and 1,000 instructional hours at the senior high level during the school year (Edmonton Public Schools, 2014).

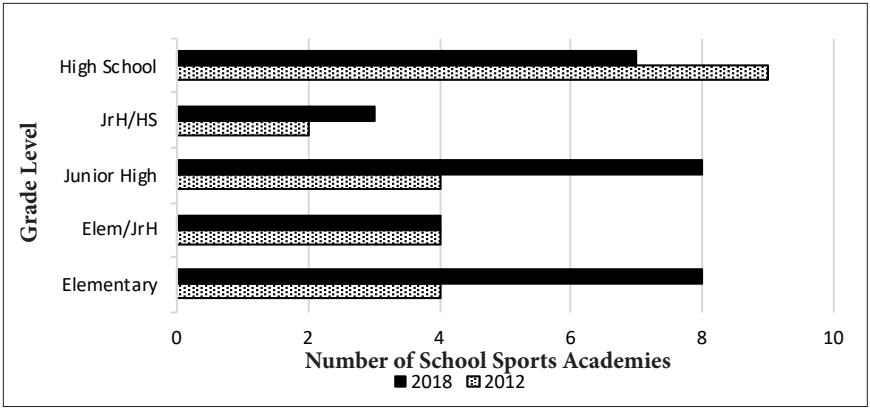
The Edmonton School District is viewed as an early leader in the creation of sports academies within the education system (Way et al., 2010). Locally Developed Courses (LDC) allowed by Alberta's Alternative Programs policy aided in the development of sport-oriented courses and the rise in the number of SSAs in the region. To get an understanding of the number of SSAs in the Edmonton region, we reviewed the literature; conducted a review of schools, school boards, and provincial sports organization websites; and had phone conversations with provincial sports organization personnel. SSA information was located on the 12 regional school board websites, which we cross-referenced to individual school websites. We grouped grades into the levels of elementary (Grades 1 to 6), junior high (Grades 7 to 9), and high school (Grades 10 to 12). We made no attempt to collect information on the specific curriculum offered at any of the sports academies.

In 2005, there were two SSAs in the Edmonton region (Vimy Ridge Academy and St. Francis Xavier High School). By 2012, this increased to 23 SSAs, which represented 25% of the total number (93) of SSAs in Alberta (Balderson, 2015). The Edmonton region includes school boards in the City of Edmonton and the communities of Leduc, Sherwood Park, St. Albert, Spruce Grove, Stony Plain, and Devon. The breakdown of the 23 SSAs were one private, 15 Catholic, and seven public. The breakdown by grade level was four elementary, four elementary/junior high, four junior high, two junior high/high school, and nine high school.

By early 2018, the number of SSAs had increased to 30 schools. Currently, 20 Catholic and 10 public SSAs operate in the Edmonton region. By grade level, there are eight elementary, four elementary/junior high, eight junior high, three junior high/high school, and seven high schools. Figure 1 shows an increase of eight SSAs at the elementary and junior high levels and a decrease of two at the high school level from 2012 to 2018.

Figure 1

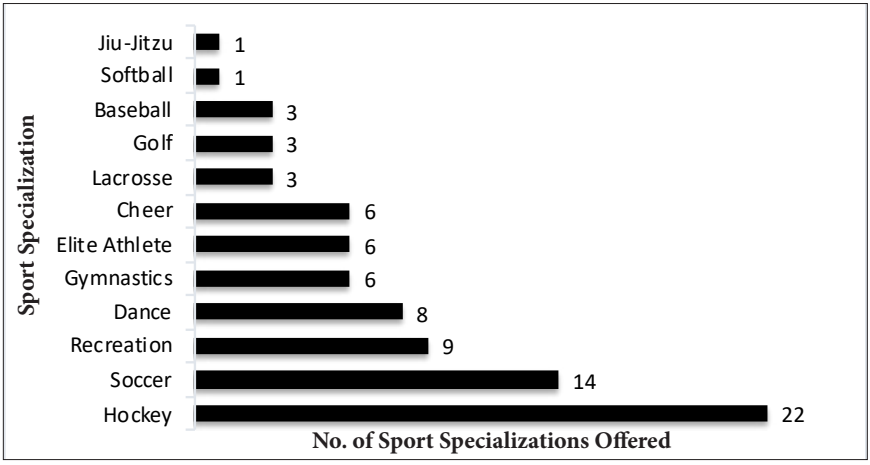
Number of School Sports Academies in the Edmonton Region



Data were also collected on the types of sport specializations offered at the SSAs (Figure 2). In total, there are 12 sport specializations in the Edmonton region. Ice hockey is offered at the most schools at 22, with soccer the next most popular at 14 schools. Six of the specializations focus on team sports[6] and the other six are individual[7] focused.

Figure 2

Sport Specializations Offered in the Edmonton Region School Sports Academies in 2018



[6] Baseball, cheer, hockey, lacrosse, soccer, softball

[7] Brazilian Jiu-Jitzu, dance, elite athlete, golf, gymnastics, recreation

Of note is that the growth in the past 6 years has been at the younger grade levels: elementary and junior high school. The decrease at the high school level could be a result of the lack of demand. At high school age (15 to 18), students start focusing on getting into a postsecondary institution, which may result in a switch of focus from sport to academics. In some cases, there is also less parental involvement and some parents allow their children to make their own decision of whether to continue at an SSA.

Discussion

Sports Organizations

Way et al. (2010) pointed out that the majority of the international elite SSAs work with their respective national sports organizations to ensure that the proper programs and instruction are being offered. Way et al. stressed that cooperation between schools and sports organizations is necessary for maximum efficiency and success of sports academies. They recommended five guiding principles to advance SSAs:

1. quality human resources (i.e. teachers, coaches, sport support services, etc.)
2. connections or partnerships with local sports organizations, provincial sports organization, and national sports organizations
3. proximity to world-class facilities or centers of excellence
4. flexibility of educational requirements
5. integration with "traditional stream" students

In conversations with personnel from four of the provincial sports organizations in the sports of gymnastics, lacrosse, golf, and softball, all of the individuals confirmed they were not involved in how the sport was being instructed at the SSAs. Access to expertise and resources, however, is made available when the SSAs request it. The provincial sports organizations were aware of the sport programs being offered in Edmonton region SSAs but seemed to be indifferent to wanting to be more involved in the teaching of their specific sport in any official capacity in schools.

On the basis of these conversations and information from websites, we conclude that most of the SSAs in the Edmonton region are

not focusing on elite athlete development except for the two schools affiliated with Hockey Alberta, a provincial sports organization.

Although a standardized SSA framework across the board is recommended by Way et al. (2010) and the Long-Term Athlete Development model, research has shown that successful SSAs have also been grassroots initiatives that account for the local factors based on physical and human resources, community connection, staff experience, and resilient leadership (Pope, 2002).

The provincial sports organizations could help the advancement of SSAs in the Edmonton region in the following ways:

1. be more involved with the SSAs in developing a sports curriculum to incorporate Long-Term Athlete Development model principles
2. assist in developing guidelines to distinguish biological age versus maturational age skills
3. develop a formal knowledge transfer mechanism between SSAs

Parental Involvement

Parents have an effect on whether their child attends an SSA, although their role and that of their child are different. Parents serve as a provider, interpreter, and role model of their young student athlete, who is effectively a user or consumer of the sport experience (Harwood et al., 2010). Parents who had boys enrolled in elite football[8] academies experienced four general dimensions of parental stress: academy processes and quality of communication (poor quality and regularity of feedback), match-related stressors (watching kids play—resultant anxieties around mistakes), sport–family role conflict (challenging nature of getting kids to matches—guilt associated with perceptions of neglect of other children), and school support and educational issues (making sure children finish their homework and study for exams; Harwood, et al., 2010). Further research in this area could determine why parents enroll their children in SSAs and what opportunities are available for students graduating from an SSA.

A development to monitor going forward in Alberta is the partnership of the private sector and local schools to operate the SSA.

[8] Referred to as soccer in North America

In 2015, the Foothills School Division in Southern Alberta entered into a partnership with Global Sports Academy (Campbell, 2015). This partnership allows the Foothills School Division to focus on academics and save money by outsourcing the cost of operating the SSA to someone else. This raises questions, how much control will the school division have on the sports curriculum being taught, and what extra costs will be borne by the parents for their children to be enrolled in the program? Will the potential extra costs be a barrier for those families that want an SSA experience for their children but cannot afford it?

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STRENGTH TRAINING

Comparison of Training Effects of Split-Style Olympic Lifts and Squat-Style Olympic Lifts on Performance in Collegiate Volleyball Players

İzzet İnce

Abstract

This study compared the training effects of split-style Olympic lifts (SP-L) with those of squat-style olympic lifts (SQ-L). In the study, the participants (n = 33 collegiate female volleyball players) were sorted on a random basis into the SP-L group (age = 15.80 ± 1.03 years; height = 164.50 ± 3.96 cm; body weight = 60.88 ± 8.26 kg), SQ-L group (age = 15.22 ± 1.2 years; height = 167.78 ± 3.53 cm, body weight = 62.02 ± 7.20 kg), and control group (CG; age = 15.14 ± 0.38 years; height = 165.29 ± 5.25 cm; body weight = 61.32 ± 5.89 kg). The groups performed split and squat snatch and clean and jerk twice a week for 6 weeks. Analysis of variance and magnitude-based inferences determined whether there was a significant difference in the measured variables among groups. In the groups, compared with the pretraining values, a significant and positive improvement was noted in posttraining leg stiffness and time to 5-m and 20-m sprint. However, for the time to 5-m sprint, the gains in the SP-L group were better (large/d = 1.79). In addition, an increase to spike jump and change of direction in the SP-L group alone was significant for the main effect of time ($p < 0.05$). The results of this study indicate

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I would like to thank the athletes for their participation in the study.

that SP-L are more effective for spike jump, change of direction, and time to 5-m sprint. Although the results of the study provide insights regarding the beneficial effects of training with SP-L rather than SQ-L, consolidation of the study results with the results of future studies is warranted.

Effective development of maximum strength and power is necessary in many individual and team sports. Therefore, athletes routinely perform strength training to improve performance-based neuromuscular abilities, such as power and strength. Olympic weightlifting (OW) is a dynamic strength–power sport in which the athletes aim to lift the highest weight by applying the techniques of snatch and clean and jerk (Chiu & Schilling, 2005). The snatch and clean and jerk are complex whole-body movements involving a high intensity of muscular contractions. For many years, athletes have used OW to develop abilities such as strength, power, and speed for recreational and professional purposes (Lloyd et al., 2012). Athletes have long used Olympic lifts and their variations as strengthening techniques to enhance sports performance. These Olympic lifts and their variations have also been included in the strength and fitness programs of several sports and have been subjected to numerous scientific research studies (Ayers et al., 2016; Comfort et al., 2011, 2013; Helland et al., 2017; Hoffman et al., 2004; Holmberg, 2013; Hori et al., 2005; Janz & Malone, 2008; Suchomel et al., 2017).

Sports experts seem to be convinced that OW exercises are highly efficient for developing functional power (Tricoli et al., 2005). It has been shown that squat-style snatch and clean and jerk techniques as well as their derivatives produce more effective training stimuli for the lower extremity (Suchomel et al., 2017) and are generally considered to be a superior training method for explosiveness (Haff et al., 2001; McBride et al., 1999; Stone, 1993). The results of previous studies reveal that squat-style full weightlifting movements are more beneficial than other training methods. Six weeks of high pulls, squat-style power cleans training leads to a better strength output increase than kettlebell training (Otto et al., 2012). Similarly, in another study, 6-week squat-style snatch and clean training revealed better vertical jump performance than traditional resistance training (Hoffman et al., 2004). A similar result was reported in the study by Arabatzi and Kellis (2012). In Tricoli et al. (2005), squat-style snatch

and clean and jerk was more effective than plyometrics. Another study also showed that squat-style snatch and clean exercises are similarly more effective than traditional or plyometric exercises (Chaouachi et al., 2014). However, in contrast to the research mentioned, Helland et al. (2017) compared among squat-style snatch and clean exercises, motorized strength and power training, and free-weight strength and power training over 8 weeks in young athletes; they reported that squat-style snatch and clean training brought about smaller improvements in vertical jump. Although there are some contradictory results, it can be said that OW is generally more effective against other weight training programs.

Split-style lifts (SP-L) were performed in competitions in the 1960s (Chiu & Schilling, 2005). Currently, squat-style lifts (SQ-L) are used for performing snatch and clean movements in OW competitons and in other events. Therefore, SQ-L is primarily considered as the Olympic lift technique among sports professionals. In fact, as far as I know, all the aforementioned scientific studies included SQ-L exercises. Anecdotally, SP-L exercises are considered easier to learn, and for some people, especially those who have flexibility, agility, and balance issues, SP-L might be a better option. Generally, there are substantial differences between weightlifters with good OW techniques and athletes participating in other sports that often engage in OW as part of their training. Athletes who lift the Olympic lifts with unsuitable techniques can reduce or remove the transfer of these lifts to other possible abilities, such as jumping and running (Helland et al., 2017). Thus, it can be said that SP-L seems to be more effective for different populations, such as beginners in sports as well as young or female athletes with weaker squat technique and body structure. There are also some concerns that some OW programs do not always translate to better performance in sports, owing to the complex techniques (Chiu & Schilling, 2005). SP-L technique is easier to learn than SQ-L and thus the aforementioned concerns can be eliminated. In addition, for successfully performing SP-L, a person needs to raise the barbell higher than that done in SQ-Ls, which means that generation of greater speed and force is warranted. Thus, I hypothesized that SP-L-based training would be more effective than SQ-L-based training with regard to enhancement of athletic performance. Therefore, the aim of this study was to address

the gaps in the literature concerning SP-L exercises because, to my knowledge, the effects of SP-L in athletes have not been investigated in any studies to date, except in only one of my previous studies (İnce, 2019). However, in my study, I could not compare between the effects of SP-L and SQ-L training exercises. For this reason, I also aimed to compare between the effectiveness of SP-L and SQ-L training techniques.

Method

Experimental Methods to the Problem

I performed pre- and posttests to compare SP-L and SQ-L exercises based on six performance variables, namely, spike jump (SJ), counter movement jump (CMJ), change of direction (COD), and leg stiffness (LS) as well as time to 5-m (S5) and 20-m (S20) sprint, of female collegiate volleyball players. The participants were randomly divided into three groups: the training groups (in addition to normal volleyball training, SP-L or SQ-L exercises were performed 2 days/week) and control groups (normal volleyball training only). Ramdomization was done based on a draw; each participant drew from a selection of two preprepared folded sheets of paper, which were identical in size, with the designated group names written on them. The training program lasted for 6 weeks, and all participants received the same pre- and posttraining test protocol.

Subjects

The participants were 33 female college volleyball players who had similar demographics and activity backgrounds. Table 1 shows the descriptive statistics of the participants. All participants were training at my university sports club and had 4.7 ± 1.38 years of volleyball experience as well as traditional weight training experience spanning over 3 to 4 months of the annual training period. Subjects were asked to maintain a normal diet during the study period. The participants and their families were informed regarding the possible risks and disturbances related to the experimental procedures, and their consent was obtained. The study protocol was approved by my university's ethics committee.

Table 1
Descriptive Characteristics of Subjects

Characteristic	Total participants (n = 33) ($M \pm SD$)	SP-LG (n = 11) ($M \pm SD$)	SQ-LG (n = 11) ($M \pm SD$)	CG (n = 11) ($M \pm SD$)
Age (year)	15.38 ± 0.98	15.80 ± 1.03	15.22 ± 1.20	15.14 ± 0.38
Height (cm)	165.88 ± 5.49	164.50 ± 3.96	167.78 ± 3.53	165.29 ± 5.25
Body mass (kg)	61.40 ± 7.11	60.88 ± 8.26	62.02 ± 7.20	61.32 ± 5.89
BMI (kg/m^2)	22.26 ± 2.26	22.48 ± 3.35	23.52 ± 2.41	20.79 ± 1.63
Training year	4.07 ± 1.38	4.08 ± 1.49	4.11 ± 1.62	4.02 ± 1.13

Note. SP-LG = split-style group; SQ-LG = squat-style group; CG = control group.

Procedures

Testing and Experimental Procedures

Tests were performed over 2 days in a resting state (no training 48 hr before the tests). On the first day, LS, CMJ, and SJ tests were performed, whereas on the second day, S5, S20, and COD tests were performed. A test familiarization session was not performed because the participants had taken these performance tests several times (at least 3) on a routine basis at certain intervals during their volleyball training session at the sports club of my university. Before the tests, subjects warmed up by performing a standard warm-up protocol comprising stretching exercises, jogging, and free jumps. Participants were motivated and encouraged to perform to their maximum capacity during all test sessions. All measurements were taken by the same researcher in the same environment.

Anthropometric Measurements and Body Composition

The height of each athlete was measured using a stadiometer with 0.01-cm accuracy by following standard procedures (Holtain Ltd., Crymych, Dyfed, UK). The body composition was analyzed using a Bioelectrical Impedance Analyzer (BC-310, Tanita Corp., Tokyo, Japan).

Leg Stiffness

LS tests were performed according to the protocol applied in a validity and reliability study (Ruggiero et al., 2016). Optojump Next (Microgate, Bolzano, Italy) stiffness protocol was applied. Two trials with a 2- to 3-min rest interval were conducted. The mean contact and flight times from all jumps obtained from the resulting vertical force–time trace as well as the body mass of participants were used in the calculation of LS. LS was calculated from the "Eq. 1" proposed by Dalleau et al. (2004).

Spike Jump and Counter Movement Jump

Subjects were tested for SJ using previously established methods by Sattler et al. (2012). In SJ, the subject used an individualized 2- to 3-step approach and performed splashing with an arm rotation. This movement involved a vertical upward jump as fast as possible with a strong backward arm rotation. The subjects were asked to perform the jump procedure in a volleyball game or practice session, similar to their personal techniques, as they found the most appropriate. The specific procedures were relatively nonstandard because I wanted subjects to use their personal styles to perform the SJ test. For the CMJ test, the participants were requested to squat and jump vertically as quickly as possible with their hands on their waists, knees at full extension, and bodies upright. Pulling off the knees in the flight phase, pausing during movements, staying out of the Optojump Next and the parallel bar range, and stepping on the parallel bars were considered to be a failed test; this test was repeatedly performed. Two trials were performed for CMJ and SJ tests with a 2- to 3-min rest interval, and the best result was used for further analysis. CMJ and SJ tests were performed using the Optojump Next stiffness protocol.

5- and 20-m Sprint Tests

The participants started the test from the starting line, 1 m behind the starting photocell, when they felt ready. The measurements were obtained using photocell (Microgate, Bolzano, Italy) placed at the starting and finishing lines of the 5-m and 20-m race track. Two measurements were taken at 3- to 5-min rest intervals.

Change of Direction

Standard *t* test determined COD ability. Four cones were placed in a T-shape arrangement. From the starting line of the first cone, the second cone was placed at a forward distance of 9.14 m, and two cones were placed at a distance of 4.57 m on the right and left sides, respectively, of the latter cone. The subjects should sprint in the forward direction up to a distance of 9.14 m from the starting line of the first cone and touch it with the tip of their right hand, run a side step with the left hand, move to the second cone that is 4.57 m to the left, touch the right cone at a distance of 9.14 m, and finally, touch the middle cone at a distance of 4.57 m. The test was considered to be complete when the subjects returned to the starting line. The timing was determined using a photocell placed on the starting line. Each participant performed two trials, which ensured reliability of the results. These trials were considered unsuccessful when participants did not contact a designated cone and did not smoothly run sideways or in the backward direction. The test was repeated twice (3- to 5-min rest intervals), and the best test result was considered.

Training Programs

During the study, three groups participated in a standard volleyball training session conducted for 6 hr/week (3 sessions/week; 120 min/session) for 6 weeks. A standard volleyball training session includes both technical skill training and tactical skill training. Typical volleyball sessions were divided into warm-up, primary, and recovery periods. The warm-up took 20 min and included increased jogging time, a mazimum of six upper body exercises (push-ups, etc.), and both upper body stretching exercises and lower body stretching exercises. In the main part of the training session, on-site skill training (attack and defense basics, technical and tactical training, special cases) and actual volleyball playing took place. The work–rest ratio was 1:1.

Because my aim was to compare the effects of SP-L and SQ-L, I controlled all variables that could affect this comparison (i.e., no participant engaged in any upper body or lower body exercises). A 2-week adaptation program was organized to teach lifting techniques to the SP-L and SQ-L groups. A lightweight training bar made of wood was used in the adaptation program. After the adaptation

program, 1RM (maximum weight that an individual can lift once) was determined by a direct 1RM perform (classical incremental method).

A standard warm-up protocol was established. The warm-up session took 20 min and included running, stretching exercises, and weightlifting with a very light training bar. The participants performed a progressive training protocol (2 days/week) for 6 weeks with an intensity rate ranging from 70% to 90%, which increased at a rate of 5% of 1RM/week. The training program was performed as 3 sets of 5 repetitions in the first week and increased by 1 set over 5 weeks. In the sixth week, the number of sets was reduced to 4 sets of 5 repetitions (Table 2). There was a 2-min rest between the sets. Each training session contained three movements of Olympic split lifts, hang split snatch, and clean and jerk. There was a 10-min resting interval between each movement. All athletes were supervised by the same coach, who was a former European gold medallist and a certified member of the National Weightlifting Federation. The athletes were encouraged to perform all their movements as fast and explosively as possible.

Statistical Analysis

Descriptive statistics for all variables were expressed as mean and standard deviation. All data were converted to their log form, which ensured that the data were normally distributed. Two-way repeated-measures analysis of variance and Bonferroni post hoc tests determined the statistical difference between all variables. Additionally, the magnitude-based inference (MBI) method was used for statistical analysis (Hopkins et al., 2009). The probability of a standardized magnitude (0.35) effect on the variables in the pre- and posttest was calculated with Cohen's *d*, and the effect size classification for strength training, as proposed by Rhea (2004) was used in this study. Based on this classification, less than 0.35 points indicates a trivial effect; 0.35 to 0.80, small effect; 0.80 to 1.50, moderate effect; and greater than 1.50, large effect. The differences in the variables were characterized by probabilistic terms, and the following scale was used: < 0.5%, most unlikely; 0.5–5%, very unlikely; 5–25%, unlikely; 25–75%, possibly; 75–95%, likely; 95–99.5%, very likely; > 99.5%, most likely. The inference was categorized as unclear because 95% confidence limits overlapped with the threshold values

Table 2
Volume (Set/Repeat) and Intensity Rates of Split Group and Squat Group Training Programs

	Week 1			Week 2			Week 3			Week 4			Week 5			Week 6		
Group	**S**	**R**	**%**	**S**	**R**	**%**	**S**	**R**	**%**	**S**	**R**	**%**	**S**	**R**	**%**	**S**	**R**	**%**
Split group																		
Split hang power snatch	3	5	70	4	5	75	5	5	80	2	5	85	7	5	90	4	5	70
Split hang power clean	3	5	70	4	5	75	5	5	80	3	5	85	7	5	90	4	5	70
Split jerk	3	5	70	4	5	75	5	5	80	3	5	85	7	5	90	4	5	70
Squat group																		
Squat hang power snatch	3	5	70	4	5	75	5	5	80	2	5	85	7	5	90	4	5	70
Squat hang power clean	3	5	70	4	5	75	5	5	80	3	5	85	7	5	90	4	5	70
Power jerk	3	5	70	4	5	75	5	5	80	3	5	85	7	5	90	4	5	70

for the smallest worthwhile positive and negative effects (Hopkins et al., 2009).

Results

Test Reliability

Intraclass correlation coefficient results were reliable: LS, $r = 0.94$ (0.89 to 0.98); S5, $r = 0.95$ (0.92 to 0.99); COD, $r = 0.93$ (0.88 to 0.97); CMJ, $r = 0.92$ (0.87 to 0.97); and SJ, $r = 0.89$ (0.81 to 0.93).

Analysis of Variance

The results for LS indicated a significant main effect and Time × Group interaction for split-style and squat-style group ($p < 0.05$). Post hoc analysis revealed an improvment in LS in both split- and squat-style groups, but this was not noted in the control group. Similarly, analysis of variance indicated a significant Time × Group interaction effect on 5-m sprint time ($p < 0.05$). Post hoc analysis revealed that both the split- and squat-style groups had an improved 5-m sprint time compared to that of the control group. There was a significant Time × Group interaction for 20-m sprint time ($p < 0.05$). The results indicated that gains for the split- and squat-style groups were greater than that for the control group ($p < 0.05$). For COD, analysis of variance results indicated a significant Time × Group interaction effect ($p < 0.05$). The split-style group showed a significant increase from that of the control group. CMJ test results indicated no significant difference in the main effect and Group × Training interaction between squat-style and control groups ($p > 0.05$). SJ test results revealed only a significant main effect in the split-style group ($p < 0.05$).

Magnitude-Based Inferences

Split-Style Group

SP-L training elicited a very likely probability of positive improvement in LS (98.4% "small" $d = 0.79$) as well as most likely probability of a positive effect on time to 5-m sprint (99.8% "large" $d = 1.79$); very likely, positive effect on time to 20-m sprint (95.9% "moderate" $d = 1.24$); possibly, positive effect on change of direction

(57.1%, "small" $d = 0.40$); and possibly, positive effect on SJ (72.6%, "small" $d = 0.53$). MBI was only unclear for CMJ ($d = -0.11$).

Squat-Style Group

SQ-L training elicited a very likely probability of positive improvement in LS (98% "small" $d = 0.70$) as well as a very likely probability of a positive effect on time to 5-m sprint (98.9% "moderate" $d = 1.79$); very likely, positive effect on time to 20-m sprint (98.2% "moderate" $d = 0.87$); and possibly, positive effect on change of direction (55.6% "small" $d = 0.39$). MBI was trivial for SJ ($d = 0.12$) and unclear with regard to CMJ ($d = -0.15$).

Control Group

MBI was unclear for LS ($d = 0.29$), time to 5-m sprint ($d = 0.42$), and time to 20-m sprint ($d = 0.06$), whereas it was trivial for SJ ($d = 0.32$), change of direction ($d = 0,01$), and CMJ ($d = 0.26$).

Discussion

This study compared the training effects of SP-L and SQ-L on LS, S5, and S20 sprint as well as on COD, CMJ, and SJ. To the best of my knowledge, this is the first study to compare the effects of SP-L and SQ-L. This study confirms the results of İnce (2019). In both studies, the same training program was administered to the participants with similar characteristics for the same period, and the same variables were evaluated. In this study, which is different from the İnce study, I aimed to compare the effect of SP-L exercises by including the SQ-L group. The hypothesis of the study was that SP-L-based training would be more effective than SQ-L-based training. This hypothesis was confirmed for S5, COD, and SJ performances. Although the MBI for COD performance in the SQ-L group was similar to that in the SP-L group, this was not confirmed by analysis of variance. In addition, although the difference in Time × Group interaction was not significant for SJ, the main effect was significant only in the SP-L group. Therefore, it is important to be careful while generalizing the aforementioned results of the study variables.

An important result of this study was that there was no significant increase in CMJ performance. In several studies, OW has been shown to be highly effective for vertical jump. Canavan et al. (1996)

Table 3

Pretesting and Posttesting Results, Analysis of Variance, and Magnitude-Based Inference Chances for Positive/Negative/Unclear/Trivial Training Effects

	Split group (N = 10)				Squat group (N = 10)				Control group (N=10)			
Performance variable	Pre *M* ± *SD*	Post *M* ± *SD*	Cohen *d*	MBI	Pre *M* ± *SD*	Post *M* ± *SD*	Cohen *d*	MBI	Pre *M* ± *SD*	Post *M* ± *SD*	Cohen *d*	MBI
LS (kNm[1])	31.39 ± 6.7	36.01 ± 4.77[#⋆c]	0.79 small	98.4/1.6/0.0 very likely positive	30.73 ± 6.44	35.96 ± 7.29[#⋆c]	0.70 small	98/0.1/2 very likely positive	39.19 ± 16.33	36.82. ± 7.36⋆[a,b]	0.29 trivial	73.9/0.5/25.7 unclear
S5 (s)	1.25 ± 0.07	1.12 ± 0.06[#⋆c]	1.79 large	99.8/0.2/0.1 most likely positive	1.29 ± 0.12	1.15 ± 0.09[#⋆c]	1.17 moderate	98.9/1.000 very likely positive	1.16 ± 0.07	1.13 ± 0.07⋆[a,b]	0.42 small	39.8/56.2/4.0 unclear
S20 (s)	3.64 ± 0.11	3.51 ± 0.108[#⋆c]	1.24 moderate	95.9/3.7/0.4 very likely positive	3.83 ± 0.20	3.66 ± 0.19[#⋆c]	0.87 moderate	98.2/1.8/00 very likely positive	3.69 ± 0.16	3.70 ± 0.15⋆[a,b]	0.06 trivial	11.3/82.1/6.6 unclear
COD (s)	11.63 ± 0.77	11.35 ± 0.64[#c]	0.40 small	57.1/41.5/1.5 possibly positive	12.14 ± 0.9	11.84 ± 0.54	0.39 small	55.6/42.6/1.8 possibly positive	12.70 ± 1.04	12.71 ± 0.92	0.010 trivial	3.0/94.3/2.7 likely trivial
CMJ (cm)	27.6 ± 2.49	26.7 ± 1.43	-0.11 trivial	10.1/47.8/42.1 unclear	25.09 ± 4.12	24.79 ± 3.56	-0.15 trivial	1.4/92.1/6.5 likely trivial	26.7 ± 3.8	27.01 ± 3.55	0.26 trivial	3.7/65.4/30.9 possibly trivial
SJ (cm)	37.1 ± 3.75	39.78 ± 2.45[#]	0.53 small	72.6/25.8/1.6 possibly positive	35.32 ± 6.04	36.03 ± 5.29	0.16 trivial	22.5/70.8/6.7 unclear	35.42 ± 3.98	36.24 ± 3.99	0.22 trivial	49.7/44.5/5.8 unclear

Note. MBI = magnitude-based inference.

[a] Different from split group. [b] Different from squat group. [c] Different from control group.

[#] Significant for time at $p < 0.05$. [⋆] Significant for Time × Group at $p < 0.05$.

found many associations between vertical jump programs and hang clean in kinetic and kinematic parameters, which means that these two abilities were very similar to mechanics. A strong association of squat-style hang snatch and clean with vertical jump was noted (Carlock et al., 2004; Hori et al., 2008). Tricoli et al. (2005) reported significant improvements in CMJ and squat jump among university students trained using OW for 3 sessions/week for 8 weeks. Channell and Barfield (2008) showed that 8-week OW training significantly improved vertical jump performance among high school athletes. Similarly, Chaouachi et al. (2014) showed that 8-week OW training provided better training adaptation in CMJ and horizontal jump performance. Unlike these studies, Hoffman et al. (2004) found no statistically significant improvement in vertical jump performance after 15 weeks of OW training in collegiate football players, but it was noted that OW was better than traditional strength training and that vertical jump tended to improve. Thus, the results of this study are not similar to the results of most studies. In another study by Helland et al. (2017), OW training resulted in smaller improvements in jumping performances than did other training modalities. This may be because I only applied an OW training protocol. Thus, other upper and lower body exercises along with OW training may result in better adaptation.

Similarly, in the study conducted by Helland et al. (2017), OW exercises alone applied to a worse performance in vertical jump perfromance and this seems to support my opinion. In this study, although there was no group interaction for CMJ performance, SP-L training for SJ performance resulted in a better adaptation. SP-L exercises and SJ can have a more similar pattern, which facilitates a better adaptation. Future research involving biomechanical parameters might give clearer results.

In addition, Helland et al. (2017) demonstrated that upper body muscles were highly active during OW training, which consequently alleviated the burden on lower body muscles. Thus, upper body adaptations may also affect jump performance. Considering the CMJ–akimbo test result and the increase in SJ performance in the SP-L group, it seems reasonable to suggest that OW training increases vertical jump performance, owing to the training responses in the upper body. Feltner et al. (1999) suggested that the reaction force

acting on the trunk owing to an upward acceleration of the arms causes subjects to produce greater muscle strength by slowing down the extension rates of their hip, knee, and ankle joints. In addition, in a weightlifting performance prediction study, the free CMJ, but not akimbo CMJ, entered the regression model (İnce & Ulupinar, 2020). Another reason contributing to 6-week OW causing insufficient adaptation could be the nature of volleyball training, which has a large scope for jumping activity.

In this study, the best training adaptation was noted in the performance of the SP-L group S5. Although there is no clearer difference in COD performance between the SP-L and SQ-L groups, SP-L are highly effective for sprint performance. Thus, SP-L seem to have a more functional movement pattern on sprint performance. Tricoli et al. (2005) reported significant improvements in 10-m sprint, CMJ, and squat jump among university students trained with OW for 3 sessions/week over 8 weeks. Chaouachi et al. (2014) showed that an 8-week OW training provided better training adaptation for S5 and S20 performances. Hoffman et al. (2004) did not find any significant difference in sprint and COD results in their research. Another study by Helland et al. (2017) demonstrated smaller improvements in jumping and sprinting performances of young athletes as a result of OW training. As mentioned, the training modality adopted in this study is similar to that adopted by Helland et al. and Chaouachi et al. (i.e., use of OW exercises alone rather than use of mixed training). Although the results of this study coincide with the results of Helland et al., they do not coincide with the results of Chaouachi et al., who found that children produced shorter responses to the training given to them.

SQ-L exercises had a significant effect on LS and the effect size was similar. According to expert opinions, although OW and its variations are emphasized as the basis for a stiffness program (Brazier et al., 2014), no specific research has been conducted regarding the training effects of OW and its variations on LS. Because stiffnes is known to have a great impact on running speed and vertical jump performance, most researchers believe that stiffness must be increased to improve sports performance (Brughelli & Cronin, 2008). Usually, the human body or body parts are modeled as a bow. Therefore, the stiffness in the human body or body parts describes the ability to

resist displacement upon application of a ground reaction force or momentum (Serpell et al., 2012). In a study that involved the measurement of leg and joint stiffness, well-trained athletes were shown to have greater LS than their peers among the general population (Hobara et al., 2010). In a similar study, Hobara et al. (2008) found that power athletes had more LS than endurance training athletes. This shows that stiffness regulating force transmission is important, especially when efficient power transmission is important for performing a similar task (Hobara et al., 2008).

Limitations

This study has some potential limitations. First, it may be inappropriate to generalize the results, owing to the relatively small number of participants in this study. However, I attempted to break this limitation by combining statistical hypothesis testing and MBI approaches, but MBI should also be considered in some of the debates concerning this topic. Second, although 2-week adaptation training session and 6-week training sessions were performed, this may not be sufficients for adaptations in some of the measured variables. Additionally, more explicit findings can be obtained by evaluating the effects of SP-L and SQ-L on kinetic and kinematic parameters so that the findings of this study can be validated. Third, only volleyball players were included in this study. The findings of this research can also be reinforced with different or integrated groups of athletes.

Practical Applications

Today, there is widespread agreement regarding the effects of Olympic lifts on force and power, especially with regard to the explosive strength. Hence, Olympic lifts are increasingly being given importance in the strength and power training sessions of several sports. This study suggests that SP-L training is more efficient than SQ-L training. Thus, due to the simplicity of SP-L and the ease of application of SP-L for different populations, these results are important with regard to evaluation of sports performance and form the basis for the rationale behind the use of SP-L instead of SQ-L. This study also showed that SP-L produces a better improvement in SJ performance, which forms the basis for choosing SP-L exercises in volleyball strength training.

Conclusion

The results of this study demonstrate that split-style lifts are more effective than squat-style lifts on 5-m sprint, change of direction, and SJ performance. This study was the first to compare the effects of SP-L with SQ-L. In addition, the effects of OW and its variations on athletic performance still remain controversial. Furthermore, extensive studies are needed in the field.

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YOU AND THE LAW

Sport Event Operators Must Deliver Promises to Avoid Gross Negligence

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Hass v. RhodyCo Productions, 26 Cal. App. 5th 11, 236 Cal. Rptr. 3d 682, 2018 Cal. App. LEXIS 710 (Aug. 13, 2018).

The case of *Hass v. RhodyCo Productions* (2018) stems from the 2011 Kaiser Permanente San Francisco Half Marathon. Peter Hass, a runner participating in the marathon, crossed the finish line and promptly collapsed. According to witnesses, the response rate by race officials was slow and confusing, and it took about 20 min for paramedics to arrive (Cote, 2011). Furthermore, after Hass collapsed, someone alerted the announcer at the finish line, who urgently requested medical assistance over the loudspeaker. Despite a number of calls for medical aid, runners and spectators began performing CPR before any staff arrived (Cote, 2011). The trial court initially ruled in favor of RhodyCo's summary judgment motion, deciding that the Hass family's wrongful death action was barred under theories of primary assumption of the risk *(Hass v. RhodyCo Productions*, 2018). On appeal, the court found that summary judgment was not justified as grounded on the primary assumption of risk. Further, the deficient medical aid would reveal a significant change from the standard of care for physical activity events. As a result, the court ruled that there was a triable issue of material fact regarding whether

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RhodyCo had been negligent or grossly negligent toward Hass's well-being.

Facts of the Case

RhodyCo conducted the event management and production services for the San Francisco Half Marathon from 2006 through 2011 (Cote, 2011). To obtain the required permits for street closures, RhodyCo was mandated to present an emergency medical services (EMS) plan to the City and County of San Francisco for consideration and consent by the City's emergency medical services agency (*Hass v. RhodyCo Productions*, 2018). According to the allegations in the Hass case, the EMS plan was approved, acknowledging that the Palmer College of Chiropractic-West (PCCW) and American Medical Response (AMR) would provide the necessary trained medical personnel. Furthermore, the EMS plan identified that PCCW trained medical staff would be in place at designated vital areas (i.e., start line, finish lines, postrace medical tent, and mobile units) located on the course. Additionally, the head clinician would be present at the postrace medical tent (*Hass v. RhodyCo*, 2018). AMR would supply an emergency medical technician to work with the PCCW medical team at the postrace medical tent as well as an Advanced Life Support ambulance to respond to medical emergencies. Finally, the EMS plan stipulated that one medical doctor, six or more emergency medical technicians, and one automatic external defibrillator (AED) would be located at the finish line (*Hass v. RhodyCo Productions*, 2018).

Almost immediately after crossing the finish line, Hass suffered a sudden cardiac arrest and collapsed (Egelko, 2018). Another marathon participant, a medical doctor, began to perform cardiopulmonary resuscitation (CPR) on Hass for 5 to 8 min, after which CPR was continued by an off-duty paramedic who possessed advanced CPR training (Egelko, 2018). Another individual carried the AED from the postrace tent, which was located somewhere between 100 and 200 yd away from the finish line. Unfortunately, when the AED was applied, no discernible shockable heart rhythm was detected in Hass (Egelko, 2018).

The Hass family filed wrongful death action, asserting that RhodyCo was (1) negligent in organizing and planning the event; (2) negligent in hiring, retaining, and supervising the medical team;

and (3) negligent in managing, training, and monitoring the emergency and medical resources (*Hass v. RhodyCo Productions*, 2018). Specifically, the Hass family stressed that chiropractors were used instead of medical doctors and that chiropractic students were used in the place of emergency medical technicians. Additionally, the Hass family alleged that ambulance personnel were not present at the finish line and that the AEDs and ambulances were inadequate (*Hass v. RhodyCo Productions*, 2018). RhodyCo answered by denying the allegations and asserting several affirmative defenses, including primary assumption of the risk and express contractual assumption of the risk and release of liability (*Hass v. RhodyCo Productions*, 2018).

RhodyCo claimed summary judgment because Hass had signed a release when he registered for the half marathon (*Hass v. RhodyCo Productions*, 2018). Furthermore, the release contained a waiver of liability and assumption of the risk agreement that was binding on Hass's relatives (*Hass v. RhodyCo Productions*, 2018). Finally, RhodyCo maintained that sudden cardiac arrest is an inherent risk of long-distance running. As a result, RhodyCo stated that the action alleged by the Hass family was barred under the primary assumption of risk doctrine. The Hass family then filed a motion for new trial, arguing that new evidence with respect to the allegations of gross negligence occurred when the head of the agency stated in the deposition testimony that chiropractic students were substituted for emergency medical technicians at the finish line and that a chiropractic doctor replaced a medical doctor as race supervisor (*Hass v. RhodyCo Productions*, 2018). There are multiple issues to this case including ordinary negligence, gross negligence, and assumption of risk.

Ordinary Negligence

Ordinary negligence may be defined as "the omission to do something which a reasonable many, guided by those considerations which ordinarily regulate the conduct of human affairs, would do or doing something which a prudent and reasonable man would not do" (Harper & James, 1956, p. 928). Furthermore, the *Hass* court considered ordinary negligence as a "failure to exercise the degree of care in a given situation that a reasonable person under similar circumstances would employ to protect others from harm" (p. 32). For it to be proved that a sports provider caused the injury or death, four

elements need to be satisfied: duty, breach, causation, and damages (Dobbs, 2000; Miller & Schoepfer, 2018). The first element, duty, indicates that the sports provider has a duty of reasonable care to make sure the competitors are safe (*Nalwa v. Cedar Fair, L.P.*, 2012). The second element, breach, explains that the sports provider violated its duty during the event (Miller & Schoepfer, 2018). The court in *Knight v. Jewett* (1992) summarized breach of duty as "those instances in which the defendant does owe a duty of care to the plaintiff, but the plaintiff knowingly encounters a risk of injury caused by the defendant's breach of that duty" (p. 304). The third element, causation, is satisfied if the plaintiff proves the sports provider was "the actual and proximate cause" of the injury or death (Burnstein, 1994). In the *Hass* case, the plaintiffs alleged that the proximate cause was the lack of trained medical personnel at the event. The fourth element, damages, is satisfied if the sports provider's conduct caused injury to the competitor (Burnstein, 1994; Dobbs, 2000). Thus, while the event manager of physical competitions has no duty to decrease risks inherent to the sport, they do have a duty to make sure that any exposure of risks to the participants is not increased (*Knight v. Jewett*, 1992). The question was whether the organizer of the half marathon acted in a grossly negligent manner by providing emergency services without appropriately qualified medical personnel, thereby increasing the risk of harm to Hass to the point of gross negligence (*Hass v. RhodyCo Productions*, 2018).

Gross Negligence

The court in *Nalwa v. Cedar Fair, L.P.* (2012) stated, "Although persons generally owe a duty of due care not to cause an unreasonable risk of harm to others some activities—and, specifically, many sports—are inherently dangerous" (p. 41). As noted, the *Hass* court supported the family members' assertions that RhodyCo committed gross negligence. Most injured parties blame the sports providers for not making the event safe (Easter et al., 2003). The main argument against the sports providers is that they breach their duty by being grossly negligent or reckless (Easter et al., 2003). The court in *Gore v. Board of Medical Quality Assurance* (1980) stated, "Gross negligence falls short of a reckless disregard of consequences, and differs from ordinary negligence only in degree, and not in kind" (p. 19).

For the range of particular negligent acts, the standard of reasonable conduct must be in proportion to the foreseeable risk (*Gore v. Board of Medical Quality Assurance*, 1980). Additionally, the plaintiff has the "burden to prove that the sports provider was grossly negligent by increasing the risk that caused the plaintiff's injury" (*City of Santa Barbara v. Superior Court*, 2007, p. 780). As the danger becomes more significant, the actor is required to exercise caution commensurate with it (*Knight v. Jewett,* 1992). By hiring a chiropractor instead of a medical doctor to supervise the EMS, RhodyCo committed gross negligence, the court concluded (*Hass v. RhodyCo Productions*, 2018).

Assumption of Risk

The doctrine of primary assumption of risk is based on the need to avoid discouraging involvement of physical activities by enforcing a duty to remove the inherent risks of harm in those activities (*Nalwa v. Cedar Fair, L.P.,* 2012). The primary assumption of risk concept functions on the idea that placing a duty on such activities would significantly change the foundational elements of the physical activity (*Nalwa v. Cedar Fair, L.P.*, 2012). For example, football without blocking and tackling would not be considered the sport of football as Americans know it. By permitting voluntary participants in physically active endeavors to litigate other participants or sponsors for failing to remove the activity's inherent risks would jeopardize the continuation of the activity (*City of Santa Barbara v. Superior Court*, 2007). The primary assumption of risk doctrine does not "release the event managers from any obligations to protect the safety of their customers" *(Knight v. Jewett*, 1992, p. 317). As a general rule, where an operator can take a measure that would increase safety and minimize the risks of the activity without also altering the nature of the activity, the operator is required to do so (*Grotheer* v. *Escape Adventures, Inc.*, 2017, p. 1300).

After analyzing the release of liability, the court ruled that Hass assumed all risks connected with the race, thereby releasing RhodyCo from all liability. This ruling barred the Hass family from asserting a wrongful death claim for ordinary negligence. Citing to *Coates v. Newhall Land & Farming, Inc.* (1987), the *Hass* court stated that when a participant expressly agrees to waive any negligence on the part of the defendant, the participant assumes all risk in a waiver.

However, should the participants not fully comprehend the potential risks, then they cannot expressly assume the risk of being injured (Easter et al., 2003). The Hass family agreed that cardiac arrest is an inherent risk of long-distance running and that RhodyCo did nothing to increase this risk. This action barred any claim from any subsequent wrongful death action based upon ordinary negligence, but not based upon gross negligence. Conversely, the court held that emergency medical care was a risk extrinsic to running and could be provided by a race organizer without altering the fundamental nature of running. Thus, because emergency medical assistance was not an inherent risk, the court ruled that RhodyCo may have committed gross negligence by failing to provide appropriately trained medical personnel at the event (Egelko, 2018).

The laws behind sports injuries protect the sports providers because the inherent risks cannot be eliminated (*Diodato v. Islamorada Asset Mgmt., Inc.*, 2014). Under certain circumstances, the assumption of risk defense may apply to protect the sports provider (*Diodato v. Islamorada Asset Mgmt., Inc.*, 2014). However, in the *Hass* case, the court ruled that gross negligence could be alleged because appropriately credentialed medical personnel were not provided during the activity as promised. As a result, the primary assumption of risk doctrine could not be employed as a defense because providing proper medical personnel, which was promised in the original agreement, would not alter the nature of the activity.

Conclusion

The *Hass* case is significant for organizations that conduct physical activities such as half marathons, marathons, 5K walks, and triathlons. First, although an assumption of risk release is written in a fashion that expressly waives liability so that the participant assumes all risk of injury, gross negligence may still exist. In the *Hass* case, RhodyCo promised to provide trained medical personnel at the finish line, including a medical doctor and six emergency medical technicians, along with an ambulance and an AED for heart problems. Yet none of these stipulations were enacted at the event. As a result, the Hass family showed that RhodyCo failed to provide adequately qualified medical assistance at the finish line and thus acted with gross negligence due to radical deviation from the ordinary standard of care. Although there is always a likelihood of

participant injury due to inherent risks, organizations that conduct physical activities must be sure to fulfill their promises in providing professional medical assistance to avoid being grossly negligent.

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