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Editorial Office

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

Subscription Office

Sagamore Publishing LLC
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COACHING

Female Athletes' Rankings of Coaching Behavior: A Longitudinal Report

Craig Stewart

Abstract

Coaching female athletes is as rewarding as it is challenging. These athletes are usually more coachable, intelligent, and mature than males at similar ages. However, they are different in many ways from their male counterparts. For example, Drobnick (2012) and Merchant (2012) have emphasized women's communication styles as seeking feelings more than solutions; conversations are often an end in themselves where expressing emotions is more important than seeking solutions. Conversely, most males, having thought out issues in advance, communicate with a purpose. When males do listen, they do so actively assuming there is a problem to be solved and they are being asked to resolve it quickly. Generally, females communicate to share and create a sense of community or relationship with someone who understands her issues. That relationship reduces anxiety and prepares her to handle the stress of her environment. The data in this report was collected over a period of 12 years on convenience samples of undergraduate female students enrolled in an introduction to coaching class at a university in the Northern Rocky Mountains. Every semester, as part of in-class assignments, students were asked to prioritize 10 characteristics of coaches in a forced ranking process. Their results were later combined with their demographic data (years of competition, the sports they played and the highest level) to stimulate in-class discussions concerning the group's competitive nature and their rankings of coaching behavior.

Craig Stewart is a professor in the Department of Health and Human Development, Montana State University-Bozeman. Please send author correspondence to cstewart@montana.edu

This is a presentation of information specifically related to the female student-athletes' rankings of coaching behavior over a period of years with practical implications for coaches to develop positive coach/player relationships, improve player motivation, satisfaction, and performance.

Literature Review

The coach/athlete relationship is one of the most important components in sport (Jowett, 2003). That dyad is foundational not only to the athletic atmosphere that binds individuals into a cohesive team, but paramount to the success of both the team and the players. This relationship and its effects on the development of positive atmospheres contribute to players' satisfaction, continued participation, increased intrinsic motivation, and overall success. Many coaches, especially young ones or those with limited professional preparation, need practical, clear, concise guidelines by which to establish those bonds (Jowett & Poczwardowski, 2007). The origins and importance of the player/coach relationship should be provided in a practical, understandable format that will assist all coaches at any level (Jowett & Ntoumanis, 2004).

The importance of coach/player relationships spans from the youth to the professional levels (Vella, Oades, & Crowe, 2013). However, if those relationships are formed by coaches who are less empathetic, use negative feedback in an autocratic coaching style, and emphasize winning as more important than the development of athletes, the results can be counterproductive to both the athlete and the team's success. Athletes in adverse environments may develop negative self-concepts, emotional and/or physical exhaustion, psychological withdrawal, and feelings of devaluation (Vealy, Armstrong, Comar, & Greenleaf, 1998). Poor player/coach relationships can affect motivation, focus, concentration, attention span, and overall team cohesion while increasing athletes' stress and ability to cope (Gearity & Murray, 2011). The foundations of those relationships begin with coaching behaviors (Cushion, 2007).

Coaching Behaviors, Player Motivation, and Performance

To convince many coaches of the effects of their behaviors, connections must be clarified between them and athlete/team performance (Jowett & Cockerill, 2003). They observed that at all the levels

of competition, positive relationships between a coach and the athlete are factors that create mutual respect, trust, care, concern, support, open communication, shared knowledge, and understanding.

The effects of coaches' behaviors on athletes' satisfaction and performance have been investigated in depth (Chelladurai, 1990; Jowett, 2009; Jowett, Yang, & Lorimer, 2012; Riemer & Toon, 2001). Likewise, the positive relationships between leadership styles, coaches' behaviors, and athletes' performance, satisfaction, and overall well-being have been well established (Crust & Azadi, 2009; Jowett & Cockerill, 2003; Philippe & Seiler, 2006). Athletes reporting positive relationships with their coaches exhibited lower levels of anxiety, higher levels of self-esteem, more positive motivational climates, and were less likely to drop-out of sport (Gearity & Murray, 2011).

Similarly, previous researchers determined that team performance and player satisfaction were improved when the coaches' behavior closely coincided with athletes' preferences (Crust & Azadi, 2009; Riemer, 2007; Riemer & Toon, 2001). In addition, positive coach/player relationships improved mental toughness, increased their preference for training and instructive behaviors (i.e., skill development aimed at improving performance), fostered players' internal locus of control, and sharpened task-oriented focus (Gucciardi, Gordon, & Dimmock, 2008; Jones, 2007).

In contrast, when a coach created a climate with less social support, reduced positive feedback, and use of punishment for mistakes, athletes perceived greater internal conflict (Balaguer, Duda, Atienza, & Mayo, 2002; Ommundsen, Roberts, Lemyre, & Miller, 2005; Smith, Fry, Ethington, & Li, 2005). Those negative climates also resulted in higher player anxiety and performance-related worry which reduced athletes' abilities to stay focused on learning, reduced their self-confidence, and remained even if they moved to other teams (Ntoumanis & Biddle, 1999; Pensgaard & Roberts, 2002; Smith et al., 2005). In summary, negative coach/player relationships often affect players' satisfaction, their performances, and their overall motivation to continue participation.

Motivation

Motivation is an ever-present topic in any sport. In his description, Nicholls (1984) wrote that motivation and mastery in athletics is viewed in either a task or an ego orientation model. Task orienta-

tion is when effort and learning is an end in itself to achieve one's goals. Ego orientation is viewed as effort and learning as means to the end of defeating an opponent. Athletes who are task oriented, therefore, define success as working hard and doing their best. Those who are ego oriented can only achieve success if, during competition, they defeat their opponent. Competition, obviously, is foundational to sports, yet when overemphasized, especially in public forums, it can foster an ego mentality (Deci, Betley, Kahle, Adams, & Porac, 1981). Athletes who are motivated by "task" participate primarily for internal reasons like fun, pleasure, or personal goals (Amorose & Horn, 2000). However, as the external, tangible rewards of mastery in sport increase, that orientation (task) may change (Deci et al., 1981; Ryan & Deci, 2000). If athletes view rewards as a result of their effort and learning, it reinforces internal motivation. However, if external rewards begin to control athletes' behaviors, internal motivation is diminished. According to Smith et al. (2005), coaches' behaviors may create positive learning atmospheres if they emphasize athletes' efforts. Coaches who provide positive feedback, while not ignoring mistakes, and limit the emphasis on winning foster internal motivation or task orientation in their athletes. However, if coaches punished athletes' mistakes, relied primarily on negative feedback, and over-emphasized performance outcomes, ego orientation or external motivation resulted.

In their examination of preferred leadership styles, Surujlal and Dhurup (2012) found the preferred coaching behaviors of both male and female athletes were training and instruction and positive feedback. The least preferred characteristic was autocratic behavior. They concluded that both males and females have similar preferences and coaches can affect the competitive environment of both genders by emphasizing training and instruction, democratic behaviors, social support and positive feedback. Coaches whose dominant characteristics were an autocratic leadership style with limited positive feedback and, generally, negative behavior degraded the coach/player relationship and should be avoided.

The critical human element in the development of motivation in sport is the coach. Even in the elite athlete, the team climate created by the coach is vital (Pensgaard & Roberts, 2002). In Pensgaard and Roberts' interviews of Olympic athletes, coaches were expected to

develop and refine skills, and also advance positive atmospheres and increase confidence. However, a focus on external criteria (medals) was contrary to those goals. Many of the elite athletes emphasized the importance of a caring and accepting climate to which the coach was a primary contributor. If even Olympic athletes are motivated more by a positive coach/athlete atmosphere, younger, less skilled athletes would rely even more on that relationship. It is as relevant to consider the effects of coach behaviors and characteristics on the female athlete, who, while as competitive as males, exhibits significant differences in many components of the coach/player relationship.

Female Athletes

A fictional video on YouTube, *It's Not About the Nail* (Headley, 2015), exemplifies one of the differences existing between the genders. In it, a young man and woman, shown only in profile, converse on a couch. The young woman is attempting to express her feelings of stress and discomfort, while the young man continually interrupts in an attempt to "fix" her problems. As she rebukes him for not listening, the camera pans back to reveal the physical cause of her problem….a nail embedded in her forehead. The young man finally relents, and begins to sympathize with her instead of trying to immediately eliminate the problem. While entertaining even to female student athletes in class, this video serves as an excellent example of one the differences between females and males.

In Merchant's (2012) more academic approach, the author emphasized the many differences between the manner in which females and males communicate. Females are more relational and personal in their communication styles, while males tend to be more assertive and direct. Though care should taken not to over-generalize, the communication differences between the genders impact many of their interactive environments.

In a more sport related example, former U.S. Women's National soccer coach Tony DiCicco wrote in *Catch Them Being Good* (2002),

> Validating a person's feelings is something I learned working with women. It is a method of interaction that optimizes listening skills. For example, when somebody comes to you and says, 'I've had a terrible day, I went to a meeting and found I was an hour late.' They do not want to hear, 'Well,

> you know, I have a great pocket notebook that works for me, and it has really kept me organized.' What they want you to say is, 'You must feel terrible about that. You probably feel like you let people down. I'm sure they're going to forgive you though, because they know the type of person you are.' This way, you're validating and sharing their feelings, or, as Colleen might say, 'wearing' those feelings with them. (p. 5).

That degree of empathy, especially in an athletic environment, is difficult for some coaches, and more so for males in general. Coaches would benefit female athletes and the programs by understanding and accepting the players' different communication styles. Sport psychologist Dr. Joan Steidinger (2014) wrote in *Sisterhood in Sport*,

> … with females, talking and communicating is very important. Females are hardwired to be more social and verbal than our counterparts … relationships are so vital to females that we handle stressful situations differently … we place more significance on the emotional connections … one-on-one friendships, empathy, positive peer group collaboration and camaraderie … and the desire for fun." (p. 1)

It is the female athletes' perspectives on preferred coaching characteristics that this study reports. The goal was to assist future coaches in methods of approaching this issue and assist them in developing positive, task-involved atmospheres. This is one of the most important areas of sport with either gender and at any level (Smith et al., 2005).

Method

Over the course of 14 academic years (24 semesters), 338 undergraduate female students in Introduction to Coaching classes participated in a number of in-class assignments. One assignment was a forced-ranking of 10 coach characteristics commonly documented in coaching education texts (Hammermeister, 2010; Martens, 2012; Sabock & Sabock, 2008; Seefeldt & Brown, 1991; see Appendix). The purpose of the exercise was to discuss peer preferences for coaches in relationship to the students' competitive histories (Table 1). The

students were asked to rank the characteristics from the most important (1) to the least important (10) and required to use each rank (1 thru 10) only once (see Appendix). Nonparametric measures were used to determine if the rankings of female students changed over the time period. Nonparametric statistical analysis (Siegel & Castellan, 1988) was used to determine that there was no significant difference between how female students ranked coach characteristics between 2002 and 2015.

Table 1
Average Years, Number of Sports, and Highest Level Played by Female Student Athletes

Years	Females *n*	Average Years Played	Sports played			Highest level of sport played			
			Three	Two	One	CV	HSV	HSJV	Other
2002	39	10.18	7	29	2	10	25	1	3
2003–04	22	9.94	3	16	3	7	13	1	1
2005	34	10	3	27	4	8	25	1	0
2006	31	10.1	25	3	3	5	23	2	1
2007	28	9.29	18	9	1	10	15	0	3
2008	11	8.64	6	3	2	2	9	0	0
2010f	25	12	18	7	0	6	17	1	1
2012f	29	8.86	24	4	1	3	20	4	2
2013f	38	8.46	27	7	4	10	24	4	0
2014f	43	9.82	30	8	5	14	25	0	4
2015sp	38	9.13	30	8	3	6	25	2	5
totals	338	9.63	191	121	28	81	221	16	20
% of total			57%	36%	8%	24%	65%	5%	6%

Note. CV = college varsity; HSV = high school varsity; HSJV = high school junior varsity; other = intramurals, middle school, club, semi-pro, etc.

Results

The female students in this report were experienced student-athletes who had played competitively in multiple sports, on average, for over nine years (Table 1). For these female student athletes, coaches' ability to teach ranked first, being fair and honest was second highest and the commitment to the development of sportsmanship, third.

The preparation of athletes to play at a higher level, the individual commitment to winning, and a coach's prior experience as a player were consistently the bottom three characteristics. These rankings were statistically consistent across the whole period of the study (Tables 2 and 3).

Table 2
Ranking of Coach Characteristics by Year/Semester

Coach characteristic	'02	'03–'04	'05	'06	'07	'08	'10 fall	'12 fall	'13 fall	'14 fall	'15 spring
Ability to teach	1	2	1	1	1	2	1	3	1	1	4
Being fair and honest with players	2	1	2	4	4	1	2	1	4	4	1
Knowledge of the skills of the sport coached	4	4	4	2	3	4	4	5	2	2	5
Commitment to the development of sportsmanship in players	3	3	3	3	2	3	3	4	3	3	2
The enjoyment of the players of their sport	7	7	7	8	7	7	8	2	6	7	3
The preparation of athletes to play at a higher level	8	6	6	7	8	6	5	8	8	8	8
Knowledge of the rules of the sport coached	7	7	7	5	5	7	6	7	4	5	7
The prevention and care of injuries	6	8	8	6	6	8	7	6	7	6	6
Individual commitment to winning	9	9	9	9	9	10	9	9	9	9	10
Experience as a player in the sport coached	10	10	10	10	10	9	10	10	10	10	9

Table 3
Overall Characteristic Rank Across All Years (2002–2015)

Coach characteristic	Rank across all years	Average rank across years
Ability to teach	1	1.22
Being fair and honest with players	2	2.67
Commitment to the development of sportsmanship in players	3	3.22
Knowledge of the skills of the sport coached	4	3.44
The enjoyment of the players of their sport	5	5.78
Knowledge of the rules of the sport coached	6	5.89
The prevention and care of injuries	7	6.78
The preparation of athletes to play at a higher level	8	7.11
Individual commitment to winning	9	8.89
Experience as a player in the sport coached	10	9.89

Discussion

As stated by Merchant (2012), the differences in the way genders communicate and interact have been documented in both the popular and scientific press. While care should be taken to avoid overgeneralization, coaches could succeed in creating a positive environment for all their athletes by recognizing these differences.

The purpose of this study was to report the rankings of coach characteristics by female student-athletes in an introduction to coaching class over an extended period of time. The in-class exercises were used to stimulate discussions within the class as to what coaching characteristics their peers felt were the most important. That dialogue allowed students to examine their rankings in relationship to the preferences of the majority of classmates. It was emphasized that over 90% of their classmates were current or former athletes, and as importantly, probably parents of future players. If individual student rankings of coach characteristics were significantly different than

their peers, how would that affect their future players' motivations and satisfaction, and, as importantly, parent interactions? Hopefully, these discussions would prepare them to coach better and create positive environments for players, coaches, and parents.

Obviously, these female student-athletes valued coaches who could teach their sport well, but in an environment characterized by fairness, honesty, and sportsmanship. These findings support Jowett and Cockerill (2003) who observed that if positive player/coach relationships develop, athletes are more focused and willing to follow directions and instructions. Athletes in positive relationships see their coaches as caring about them as people and seek support and advice away from the sport. Those strong personal relationships developed by positive communication and individualized interaction (without the perception of favoritism), increased athletes' well-being while improving player and team performance. Others have reported similar findings that the effects of negative coaching behaviors such as bad coaching behaviors, poor personalities, little or no teaching or communication skills, overall lack of knowledge or an over emphasis on winning, affected their athletic experiences and/or their willingness to continue participation (Stewart, 1993; Stewart, 2013; Stewart & Owens, 2012; Stewart & Taylor, 2000).

Others found that female athletes were concerned with elements of competition different than males (Steidinger, 2014; Wang, Chen & Li, 2004). Certainly, female athletes are not less competitive than their male counterparts, but their approaches and preferences are unique. If coaches accept, understand, and plan for those idiosyncrasies, positive competitive atmospheres will contribute to increased performance and player satisfaction. This report also highlighted that coaches who emphasized winning or playing at a higher level were not ranked as high as some would imagine. This lack of value placed on extrinsic rewards should be noted. Likewise, having played their sport was not an important coaching characteristic and counters the concept that being a former player in a sport was a preferred characteristic. In reality, there are more former players who failed as coaches than succeeded. Coaches should recognize these rankings by experienced players and adjust their behaviors accordingly. If accomplished, positive athletic environments are developed that include a constructive learning atmosphere, optimistic socialization

opportunities, and a more caring and ethical atmosphere, players, coaches, and programs will excel.

In conclusion, as recommended by Philippe, Sager, Huguet, Paquet, and Jowett, (2011), the investigation of the coach-athlete relationship should continue. It should be examined in different sports and at different levels of competition, starting with younger athletes and documenting any changes across time. Of special concern should be the progression of the 'millennial' generation into sport. The characteristic of those young athletes is already being discussed in numerous venues (Hoffman, 2008; Zotos, 2015). Coaching is a difficult, demanding profession, but rewarding and positively addicting. The failure to understand, accept and accommodate for individual differences in players will not make it easier. To succeed, coaches should know their players as well as they know their sport and how to teach it. If accomplished, the atmosphere in which players and coaches exist would be a more positive, competitive environment where the chances for success will be maximized.

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Appendix

Instrument Used in Class to Rank Coach Characteristics

In class: COA 205 INRO. TO COACHING ----- spring 2015

Student name _____ (please print clearly)

Gender: (circle one) F M

Number of years played competitive sports: _____

Highest level of sport played: (circle one) college varsity…..high school varsity ….. middle school

Other? Please list _____

WHAT DO YOU THINK ARE THE MOST IMPORTANT CHARACTERISTICS OF A COACH?

(RANK THEM 1 FOR **HIGHEST**…… DOWN TO 10 FOR THE **LOWEST**.)

COACH CHARACTERISTICS:	**RANK:**
A commitment to winning	
Development of players to play at a higher level of play	
The development of sportsmanship in players	
Fair & honest treatment of athletes	
Commitment to enjoyment of sport by players	
Knowledge of the rules of the sport they coach	
The ability to teach their sport	
Knowledge of the skills of the sport they teach	
Experience as a player of the sport they coach	
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The Impact of Stability Balls, Activity Breaks, and a Sedentary Classroom on Standardized Math Scores

Tim Mead, Lesley Scibora, Jolynn Gardner, Sean Dunn

Abstract

The purpose of the study was to determine if standardized math test scores improve by administering different types of exercise during math instruction. Three sixth grade classes were assessed on the Measures of Academic Progress (MAP) and the Minnesota Comprehensive Assessment (MCA) standardized math tests during the 2012 and 2013 academic year. The MAP standardized test was given at the beginning and end of the academic year. The MCA test was given every spring. The classes used the same math curriculum. Each class had a different math teacher, but each teacher taught the same class all year. One math classroom (n=23) did no physical exercise during instruction, another (n=29) conducted two 5-min physical activity breaks during each math period, and the third math classroom (n=29) always sat on stability balls. A one-way ANOVA was computed for both MAP and MCA improvement scores across the three classrooms to determine if exercise affected standardized math test scores. MAP improvement scores were significantly higher for the class that sat on stability balls (mean = 11.6, SD = 6.9) when compared to the sedentary class (M = 5.5, SD = 7.0). MCA

Tim Mead is an associate professor and Lesley Scibora is an assistant professor in Health and Human Performance at the University of St. Thomas. Jolynn Gardner is the director of public health in the Department of Health Studies at American University. Sean Dunn is a former teacher at Expo Elementary. Please send author correspondence to mead3373@stthomas.edu

improvement scores were also significantly higher for the stability ball class (M = 104.9, SD = 19.7) when compared to the class that conducted activity breaks (M = 92.6, SD = 7.4). The results indicate that stability balls may provide better focus for learning than short duration vigorous physical activity or no physical activity during math instruction.

Over the last 20 years, stability balls have become popular among fitness professionals and exercise enthusiasts in strengthening the abdominal core, working on balance and posture, and introducing variety to workout routines. Workplaces have also incorporated stability balls as replacements for standard desk chairs to provide exercise opportunities for employees. A more active workforce may experience lower health-care costs associated with diseases linked to excessive daily sitting at work (Owen, Bauman, & Brown, 2009). In Europe, many grade schools long ago replaced standard desk chairs with stability balls (Illi, 1994). Stability balls have been useful in improving fitness and providing support for the trunk, legs, and feet during abdominal exercises (Zipes, 2005) and during therapeutic exercise for children (Witt & Talbot, 1998).

A growing body of research supports the notion that exercise can improve grade school academic performance (Castelli, Hillman, Buck, & Erwin, 2007; Dwyer, Sallis, Blizzard, Lazarus, & Dean, 2001; Stevens, To, Stevenson, & Lochbaum, 2008; Wittberg, Cottrell, Davis, & Northrup, 2010), even in the academic core areas of math (McNaughten & Gabbard, 1993) and reading (Mead, Roark, Larive, Percle, & Auenson, 2013). Additionally, incorporating short physical activity breaks during academic instruction are believed to help meet exercise guidelines for children (Wadsworth, Robinson, Beckham, & Webster, 2012) and may help children learn (Castelli & Ward, 2012). However, no research has investigated whether stability balls can produce the same grade school academic gains as formal exercise. Classroom research using this equipment has focused on stability balls as therapy for improving on-task behaviors and enhancing classroom participation of students with sensory and communication disorders.

Schilling and Schwartz (2004) studied the sensory processing aspect of autism and proposed that modulating sensory information with therapy balls may improve classroom behavior. Students

without autism can effectively regulate sensory information to better attend and interact with others. Students with autism respond differently to sensory input and have difficulty registering, integrating, and modulating their sensory systems, which may lead to lack of attention and disruptive behaviors. To test whether arousal levels can be altered during sitting for students with autism, the researchers replaced standard chairs of four preschool children with immobile stability balls during certain times of the day for a maximum of 10 min each session for 3 weeks. After 2 weeks of observation, the researchers observed a marked improvement in classroom behavior and engagement. Upon removal of the balls, an immediate decline in classroom behavior and engagement was observed. In this study, the stability balls appeared to have provided students with autism a means to move while seated, thereby attaining an optimal state of arousal. Bagatell, Mirigliani, Patterson, Reyes, and Test (2010) expanded on the work of Schilling and Schwartz by using the Sensory Processing Measure: Main Classroom Form and video cameras to assess frequency of behaviors of six boys with autism in a kindergarten through first grade class. In this study, the benefits of using stability balls was found to depend on the type of sensory processing disorder. Stability balls were to found to be more appropriate for children who seek vestibular-proprioceptive input when compared to other sensory processing disorders.

In an earlier research study, Schilling, Washington, Billingsley, and Deitz (2003) investigated whether stability balls improved in-seat behavior and legible word productivity of students with attention deficit hyperactivity disorder (ADHD). Three students in a fourth grade inclusive language arts classroom were used in data collection. In-seat behavior was defined as behavior when the student's buttocks was in contact with the ball and both feet and ball were touching the floor. Ten-second observations were conducted over five 2-min periods. Legible word productivity was defined as the difference between the child's legible word production and the class average on the same assignment. All classroom students, including those without ADHD, received stability balls. A 1-week novelty period was provided where students became accustomed to the balls before the observation period occurred. All three participants with ADHD improved sitting behavior and legible word production. Students without ADHD were

not observed for in-seat behavior. One participant improved in-seat behavior because the ball provided a means to rock or bounce which may be explained by the ability to meet changing sensory needs of the task and environment. A second participant improved because a standard chair produced extreme postures that were not possible on a ball since one foot always needed to be in contact with the ground. The third participant improved because the ball prevented the student from falling asleep, which often occurred on a standard chair.

The functional performance of students with ADHD while seated on a stability ball has been further investigated by analyzing their electroencephalography (EEG) and reaction time (RT) during auditory tasks (Wu et al., 2012). These researchers investigated whether a stability ball was an effective means of integrating the sensory systems of proprioception, touch, and vestibular. Gentle rocking, swinging, bouncing, at times aided by stability balls, is often used by therapists to assist a child in sensory integration. Children with ADHD have disturbances in brain activation during cognitive tasks that include slower latencies and ineffective event-related brain potentials (ERPs; Senderecka, Grabowska, Szewczyk, Gerce, & Chmylak, 2012). Fifteen children with ADHD were compared to 14 children without disability on a RT task where participants pressed a response button upon hearing a high-frequency auditory signal. Students were told to ignore low-frequency signals. RT and EEG readings were recorded during the task. Children without disability scored faster RT than children with ADHD, but students with ADHD had statistically faster RT while seated on a stability ball versus a standard chair. The RT difference between the two groups of participants also decreased when introducing the stability ball. The stability ball helped alleviate the difference between the two groups of students. The stability ball appeared to activate the proprioceptive and vestibular systems, thereby helping the students modulate task sensory information and better focus on responding to the auditory stimulus (Wu et al., 2012).

Kilbourne (2009) conducted one of the few published studies on the effectiveness of stability balls using only students without a disability. The target population was college students in a one hundred level history and philosophy of sport class. Academic performance was not assessed, but attitudes toward the balls indicated that enthu-

siasm was present during usage. Participants in the study commonly reported that the balls made them pay more attention, concentrate, and stay engaged during instruction. Posture and activating lower body muscles were also frequently reported. Al-Eisa, Buragadda, and Melam (2013) similarly investigated the effectiveness of stability balls among 40 Saudi physical therapy college students. The focus was on seating discomfort and problem-based learning. Participants reported less musculoskeletal discomfort in the Cornell Musculoskeletal Discomfort Scale while seated on the stability ball when compared to sitting in traditional desk chairs. Additionally, participants were given a questionnaire addressing attitudes about the usage of stability balls during class. Respondents reported higher class participation, comprehension, cooperation, and attention while seated on a stability ball.

The effectiveness of stability balls in fostering attention and engagement of students is evident in the studies cited. However, based on the research, this has been generally found among students with disabilities. Surprisingly, the effectiveness of stability balls in improving actual academic performance for general education students is lacking in inquiry. No published research has investigated whether stability balls can improve core areas of reading, writing, science, and math. The purpose of this study was to compare academic performance (standardized math test scores) of sixth grade math students at an elementary school in St. Paul, Minnesota, between those who use stability balls to those who exercise during class instruction and those who maintained a sedentary learning environment. The particular school was chosen because of its diversity, urban location, and funding to provide exercise equipment to students during instruction.

Method

Expo Elementary is a PreK–6 grade elementary school in an urban area of St. Paul, Minnesota. The enrollment during the 2012–2013 academic year was 763 students. The school maintains a diverse student body with 1% American Indian, 10% Asian American, 23% African American, 8% Hispanic American, 59% Caucasian American, and 13% English Language Learning. Twelve percent of students qualify for special education, and 35% of the students are eligible for free and reduced lunch. Based on standardized testing,

the percentages of students in sixth grade in the spring 2013 who were proficient in reading and math were 79% and 58%, respectively.

Participants

This project was approved by the University of St. Thomas Institutional Review Board (IRB #379238-1). Parental consent and child assent was obtained. Expo Elementary has three sixth grade math classes, and all were involved in the study. The students in each class were assigned randomly to each classroom at the beginning of the school year. No students involved in the data analysis had special needs. All three classes held math from 8:40 a.m. to 10:00 a.m. every day of the week. The sixth grade class that sat on stability balls (STAB) had an enrollment of 29 students. The sixth grade class that implemented activity breaks (ACTB) contained 29 students also, and the sedentary class (SEDC) had an enrollment of 23. The ages of all participants was 11 or 12 years of age. Thirteen girls were in the STAB class, 16 in the ACTB class, and 13 in the SEDC class. The STAB class was 52% Caucasian, 28% African American, 7% Hispanic, 7% Asian, and 7% Native American students. The ACTB class consisted of 48% Caucasian, 28% African American, 14% Hispanic, and 10% Asian students. SEDC contained 39% Caucasian, 26% African American, 13% Hispanic, 17% Asian, and 4% Native American students. The STAB teacher had 20 years of elementary education experience, whereas the ACTB and SEDC teachers both had 15 years of elementary education experience each at the time of the study.

Apparatus

The Minnesota Comprehensive Assessments (MCAs) are state achievement tests in mathematics, reading, and science that meet the requirements of the federal Elementary and Secondary Education Act (ESEA). They are given every year to measure student performance against the Minnesota Academic Standards that specify what students in a particular grade should know and be able to do. The State of Minnesota requires that all students in public schools participate in the statewide assessment program. Mathematics and reading tests are given in Grades 3–8 and high school (students in Grade 10 take the Reading MCA and students in Grade 11 take the Mathematics MCA). The Science MCA is given to students in Grades 5 and 8 and in the high school grade when they take a life science

or biology course (MN Department of Education, 2013a). The test is administered every spring in late April. Scores range from G01 to G99 where "G" represents grade level of the test taker. All students in this study automatically increased their math MCA scores by 100 points merely by moving from fifth grade to sixth grade. At the sixth grade level, a score of 661 or higher meant the student exceeded the math standards. A score range of 650–660 meant the student met the standard. A 640–649 score range meant partially met, and below 640 meant the student did not meet the math standards (MN Department of Education, 2013b).

The Measures of Academic Progress (MAP) is a standardized test that assesses reading, mathematics, and language for Grades 3–12. It is a computerized assessment that adapts to responses to test questions and to the child's skills and knowledge. The content of the exam changes as the student answers correctly or incorrectly. Results are based on an equal interval scale to determine proficiency level, instructional readiness, and selection of instructional resources to best meet the student's ability. The outcome data identifies the differentiated instruction needed for the child, flexible grouping for instruction, and proficiency projections on how the student will perform on state assessments. The math portion covers problem solving, number sense, computation, measurement and geometry, statistics, probability, and algebra. For sixth graders, a fall MAP math score of 220 or better was considered above grade level, at grade level was a score of 219, and a score at 218 or lower meant below grade level. Spring MAP scores required a score of 226 or higher to be considered above grade level, 225 meant at grade level, and a score lower than 225 was considered below grade level (Northwest Evaluation Association, 2013). The test was administered the beginning of October 2012 and the end of May 2013.

The stability balls were purchased from Wittfitt Learning in Motion. The balls were made in Italy from PVC material. Each ball was 55cm, which was the recommended size for children up to sixth grade. The balls were inflated to different loads in order to fit the varying heights of the children in the classroom so that they could all sit with feet flat and knees and hips bent at 90 degrees of flexion.

Procedure

A three independent group pretest–posttest design was used with one class serving as the control group. Difference scores of the pretest and posttest MCA and MAP scores were calculated and then compared across three independent classrooms. All sixth grade students at Expo Elementary completed the same block sequence of courses in math, science, and reading and writing. In these core subjects, each class duration was 80 min. Math began at 8:40 a.m., followed by science at 10:00 a.m., music or physical education at 11:45 a.m., recess and lunch at 12:35 p.m., and reading and writing at 1:20 p.m. The scope and sequence for math, reading and writing, and science was the same for all three classrooms.

The math curriculum that was implemented at Expo Elementary was called Every Day Math (University of Chicago School Mathematics Project, 2012). Each math class conducted 4- to 6-week units on the math topics of collection, display, and interpretation of data; operations with whole number and decimals; variables, formulas, and graphs; rational number uses and operations; geometry: congruence, constructions, and parallel lines; number systems and algebra concepts; probability and discrete mathematics; rates and ratios; more about variables, formulas, and graphs; and geometry topics. Each math class was divided into an opening segment (25 min) and a work time segment (55 min). The ACTB class had 10 min less of work time since a total of 10 min was devoted to physical activity. During the opening segment, students would be presented first with a math message and a problem to solve. This would be followed by mental math exercises, then reviewing concepts and homework, and finally an introduction to the lesson for the day. The last 55 min of the math class would be devoted to work time where students would work in small groups or receive assistance from the math teacher.

Each of the math classes was assigned to one of three treatments: activity breaks (ACTB), stability ball (STAB), and sedentary (SEDC). In one math class (ACTB), 5-min physical activity breaks were implemented and occurred immediately after the math message and immediately prior to the beginning of work time. Five-minute activity breaks were based on research indicating that children should be active for 5 to 10 min following a 60-min period of inactivity. Additionally, the benefits of exercise last between 40

and 60 min (Castelli & Ward, 2012). To get the students aroused and moving, the ACTB teacher would pick a student to roll a dice three times. Based on the dice numbers rolled, all students would have to perform the corresponding activities for 30 s each. At the end of 30 s, students would perform the next activity corresponding to the dice roll. After 1.5 min, students would then perform the next set of activities corresponding to the dice roll. This process would continue until 5 min were up. Table 1 lists the physical activities corresponding to the dice rolls. Students had the option to not participate in the physical activities but only rarely did a student choose to stay seated during this time.

Table 1
Exercises Completed in the ACTB Class Based on Roll of the Dice

Target area	Strength exercises	Dice roll	Cardiovascular exercises	Dice roll
Upper Body	pushups	1	speed bag	2
	tight arm circles		punches	
	plank		big arm circles	
Lower Body	step-ups	3	running in place	4
	squats		log jumps	
	lunges		high knees	
Both	burpees	5	jumping jacks	6
	sit-ups		mountain climbers	
	bicycles		jump rope	

The STAB teacher removed all chairs at the start of the school year and replaced the standard desk chairs with appropriate-sized stability balls so that all students could sit on the ball such that the student's back was straight, hips and knees bent at 90 degrees, and feet were able to lay flat on the floor. The STAB teacher did not incorporate any other physical activity during math class. The SEDC teacher taught without implementing any physical activity at any time of the year during math class time.

Results

There were four students who did not complete both a MAP pre- and posttest (STAB = 2, ACTB = 1, SEDC = 1). For the MCA tests, two students in STAB and SEDC along with five students in ACTB did not complete pretests and posttests. Reasons for not having both test scores were absences during testing, a student could not complete the general test because of disability, and moving between schools during the timeframe of this study. Students with a missing pretest or posttest score could not be used to determine effectiveness of the interventions. SPSS version 19 was used for all data analysis.

A one-way ANOVA was computed to determine if the three classes differed on the pretests. The MAP pretest (fall 2012) math scores were not significantly different between the three classes, $F(2, 79) = 3.1$, $p = .052$. Similarly, the MCA math pretest scores (spring 2012) were not significantly different between the three classes, $F(2, 76) = 2.37$, $p = .10$. Table 2 provides the means and standard deviations of the MAP and MCA scores for the three classes. MAP and MCA posttest refers to the spring of 2013 test scores. Table 2 includes all student test score means and standard deviations including those students who may have not taken both a pretest and posttest. Table 3 indicates the percent of students in each class who met the standards for both the MAP and MCA pretests and posttests.

To determine if the interventions had an effect on standardized math test scores, a one-way ANOVA was computed on difference scores (posttest–pretest) for both the MAP and MCA tests. For the MAP test, a significant main effect was computed on difference scores, $F(2, 76) = 4.1$, $p = .021$, across the three classes. A Tukey post hoc analysis indicated that difference scores were significantly higher ($p = .016$) for the class that sat on stability balls (STAB; $M = 11.6$, $SD = 6.9$) when compared to the sedentary class ($M = 5.5$, $SD = 7.0$) but not significant ($p = .254$) when compared to the class with activity breaks ($M = 8.4$, $SD = 8.0$). A Cohen's d was then calculated between STAB and SEDC ($d = .88$), indicating a large effect size. ACTB and SEDC did not differ on MAP difference scores ($p = .367$) according to the post hoc test. Males did not differ from females on the MAP difference scores, $F(1, 76) = .007$, $p = .933$.

Table 2
MCA and MAP Scores for the Three Sixth Grade Classrooms

	MAP pretest (fall 2012)		MAP posttest (spring 2013)		MCA pretest (spring 2012)		MCA posttest (spring 2013)	
Classroom	***n***	***M* (*SD*)**	***n***	***M* (*SD*)**	***n***	***M* (*SD*)**	***n***	***M* (*SD*)**
STAB	28	228.3 (11.7)	28	238.7 (12.1)	28	532.3 (31.6)	28	636.4 (34.5)
SEDC	23	221.2 (16.0)	22	226.0 (15.1)	22	543.9 (13.1)	22	643.1 (12.4)
ACTB	28	219.7 (14.0)	28	226.8 (15.1)	26	527.3 (29.8)	25	620.9 (34.2)
Total	80	223.1 (14.2)	78	230.8 (15.1)	76	533.8 (27.4)	75	633.1 (30.8)

Table 3
Percent of Students for Each Class Meeting the MAP and MCA Requirements

	STAB		ACTB		SEDC	
Standardized test	**Pre-test**	**Post-test**	**Pre-test**	**Post-test**	**Pre-test**	**Post-test**
MAP						
Above Grade Level	82	86	50	57	57	55
At Grade Level	0	0	4	0	4	5
Below Grade Level	18	14	46	43	39	40
MCA						
Exceeded Standard	32	36	31	20	9	5
Met Standard	29	36	12	16	27	32
Below Standard	39	28	57	64	64	63

For the MCA test, a significant main effect was calculated, $F(2, 71) = 5.4$, $p = .006$, on difference scores. For the class that sat on stability balls, a Tukey post hoc test showed a significant difference ($p = .004$) between STAB ($M = 104.9$, $SD = 19.7$) and the activity break class ($M = 92.6$, $SD = 7.4$) but not ($p = .19$) the sedentary class ($M = 98.0$, $SD = 6.8$). A Cohen's d was then calculated between STAB and ACTB ($d = .83$) indicating a large effect size. ACTB and SEDC did

not differ on MCA difference scores (p = .362) according to the post hoc test. Males did not differ from females on the MCA difference scores, $F(1, 71) = .828$, $p = .366$. Thus, stability balls had an impact on standardized test taking in mathematics.

Discussion

This is the first known study to investigate whether stability balls can yield the same academic benefits as other types of exercise done during, prior, or after instruction. The purpose of the study was to determine if implementing various types of exercise in the core curriculum can positively impact standardized test scores of grade school students in the academic area of math. The three teachers in the study followed the same set math curriculum of instruction, used the same in-class assessments and text, and sought to obtain the same Minnesota K–12 Mathematics Academic Standards (MN Department of Education, 2013c). The scope and sequence for all three classes was exactly the same. The only differences between the three classes were the teacher for each class and the nature of physical activity incorporated during the school day. The three teachers were veterans in implementing effective pedagogical practices. The results of this study indicated that incorporating certain modes of exercise in math class can positively impact standardized test scores. Short physical activity breaks during class time were not effective in improving math scores but continuous low intensity posturing and positioning activities in the classroom using a stability ball were effective.

One explanation why stability ball usage was more effective in influencing academic performance may be that the stability balls resulted in greater alertness and arousal during academic instruction than intermittent bouts of activity or no physical activity. Previous research, mostly among students with disabilities, has indicated that students with certain types of sensory disorders can benefit from stability ball usage (Bagatell et al., 2010). While students in the present study did not have known disabilities of any type, the stability balls do provide vestibular, somatosensory, and proprioceptive stimuli to the user as they control posture and muscle tone necessary to maintain balance in a seated position (Schilling & Schwartz, 2004). By activating these systems, the stability balls may produce a level of

awareness, integration, and regulation of sensation that can facilitate learning.

Stability ball use may have improved students' task attention, resulting in greater gains on test scores. Schilling et al. (2003) showed that children with disabilities stayed in their seat when using a stability ball and remained on task. Participants in this study may have found that it was difficult to alter their seated position on a stability ball (i.e., leaning back or to the side to converse with a neighboring student); thus, they remained focused during instruction and/or work time. Moreover, the ball also made it difficult to turn away from the desk to look out the window or at other in-class distractors during class time. Students also undoubtedly found that they could not quickly get out of their seated position on the ball and go off task when the teacher was not looking. Some students gently bounce on the ball during class time, which might stimulate the vestibular, proprioceptive, and somatosensory systems. The activation of these systems on a stability ball appears to facilitate attentional focus and minimize distracting stimuli that interfere with learning.

Several strengths and limitations should be noted. The present study is strengthened by several factors, including the use of state standardized achievement tests, a common curriculum, and teacher experience. The three teachers in each study classroom followed the same set math curriculum of instruction, including in-class assessments and text, and sought to obtain the same Minnesota K–12 Mathematics Academic Standards (MN Department of Education, 2013c). Moreover, the teachers were veterans (minimum 15 years of teaching experience) in implementing effective pedagogical practices. Study interventions were randomly assigned to the three mathematics classrooms. Thus, the differences between the three classes were the teacher for each class and the nature of physical activity incorporated during the school day.

This study did not have access to scores in other academic areas. Comparing stability ball usage in English or reading or science classes may better target where learning could be facilitated. This study is also limited in that two activity breaks were provided during math class. It is unknown if, when, and how many activity breaks are needed to increase learning and retention of subject areas like math, reading, English, and science. Short duration physical activity has

been found to increase academic performance (Hillman, Pontifex, Raine, Castelli, Hall, & Kramer, 2009) but not in this study. Taking more than 10 min out of instructional time in order to exercise may be hard to justify to school administrators. Physical activity breaks done during transition times between classes may be more effective and would not take away from valuable instruction time. This study is limited in that each classroom had a different teacher. Although not statistically different, the STAB class had more students meeting the MCA and MAP standards before and after the interventions. Whether this affected improvement scores is unknown. Additionally, intricacies among teachers may have accounted for some of the differences in math improvement scores between the three classrooms. Rotating stability balls between classroom teachers at varying times of the year and then looking at academic test scores may better identify stability ball effectiveness in increasing learning. Last, the ACTB class had 10 min less of actual math work time every day due to the physical activity breaks. It is unknown if this factor negatively affected math scores but no research to date has found that incorporating physical activity hinders academics.

We showed that replacing traditional desk chairs with stability balls improved sixth grade students' standardized test scores in math compared to 5-min activity breaks and no physical activity during math class. This intervention suggests that stability ball use may be a simple, effective means of improving student learning the core academic area of mathematics. This study presents school administrators and teachers, who are under pressure to raise test scores, an alternative option to expensive and timely remediation measures that are currently being employed throughout the United States. Further research is needed to learn whether stability balls may improve other core academic areas like writing, reading, and science. In addition, it is important to understand the physiological processes underlying improved test achievement scores following exercise that was observed in this study. The results of the present study are nonetheless intriguing and highlight the need for more research in this area.

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Manifestation of Anti-Fat Bias in Preservice Physical Education Teachers

Tucker Readdy and Tristan L. Wallhead

Abstract

Previous research has documented the presence of implicit and explicit anti-fat bias in preservice physical education teachers (Fontana, Furtado, Marston, Mazzardo, & Gallagher, 2013). Such studies speculate that anti-fat bias can result in discriminatory behavior against overweight or obese physical education students. Discriminatory teacher behavior may include reduced frequency and quality of teacher feedback (Greenleaf & Weiller, 2005). Such interactions are problematic as they may negatively impact student learning and ultimately serve to inhibit students' adoption and maintenance of a physically active lifestyle. The purpose of this study was to examine the extent to which anti-fat bias existed within a sample of 18 preservice physical educators, as well as to explore whether that bias manifest in the quality and frequency of teacher feedback provided within K–12 physical education settings. Preservice teachers completed a preobservation measure of implicit and explicit anti-fat bias and then were systematically observed for

Tucker Readdy and Tristan L. Wallhead are associate professors, Division of Kinesiology and Health, University of Wyoming. Please send author correspondence to tucker.readdy@uwyo.edu

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the frequency and type of feedback provided to students perceived as normal and overweight. Following the practicum, a sample of preservice teachers completed qualitative interviews designed to assess perceptions of differential behavior, potential consequences of that behavior, and strategies for eliminating such preferential treatment.

Quantitative results indicated there was no significant correlation between teachers' implicit and explicit anti-fat biases. In addition, instructors with strong implicit and explicit bias tended to give more feedback regardless of weight status, while those with moderate bias generally interacted less frequently with students perceived to be overweight. Finally, teachers with no bias tended to communicate equitably across the two weight statuses. Qualitative results provided some explanation for these behavior patterns and suggest that some educators may change their feedback to be more encouraging to perceived overweight students, but overall teacher behavior is primarily driven by the need to engage in good pedagogy and improve the skill of all learners.

Growing rates of overweight and obesity in children and adolescents has promulgated an increased focus on the need for physical activity promotion programs within this population (Krishnamoorthy, Hart, & Jajalian, 2008). For children and adolescents, a good portion of their waking time is spent within the structured environment of schools. These venues have subsequently been vaunted as an ideal setting for the promotion of physical activity, as they reach a large number of young people (Centers for Disease Control and Prevention, 2011; McKenzie et al., 2004). As a programmatic physical activity promotion system embedded within the school curriculum, physical education is often viewed as the flagship agency for students to learn the knowledge, skills and motivation to participate in regular physical activity (National Association for Sport and Physical Education [NASPE], 2008). Given the growing diversity in body shape, size, and physical abilities of students in physical education settings, these goals will only be achieved if programs effectively meet the needs of all students, including those that are overweight or obese.

Recent media discourse has identified obesity as a drain on a nation's health resources (Begley, 2012), which has served to establish a discriminatory social agenda against overweight and obese individuals (Puhl, Andreyeva, & Brownell, 2008). Specifically, overweight individuals are often stigmatized as lazy and self-indulgent (Puhl &

Heuer, 2009). Evidence would suggest that this stigma has maladaptive consequences for perceived control of physical activity behavior. For example, research with college-aged females has shown that the stigma of being overweight increases motivation to avoid exercise and may increase, rather than decrease, the weight of overweight individuals (Vartanian & Shaprow, 2008). Against this backdrop of media stigma, the key role of the physical educator in the promotion of physical activity in the school becomes paramount. Physical educators have the potential to directly influence lifelong attitudes toward physical activity through their roles in schools and the community. However, the needs of overweight students are only likely to be met if teachers overcome societal anti-fat biases and provide these students with equitable opportunities for learning within physical education (O'Brien, Hunter, & Banks, 2007).

Teacher Expectation Theory

It is well established that person cues (e.g., gender, race, physical appearance) can elicit teachers' expectations regarding student performance outcomes within an educational environment (Rosenthal & Jacobson, 1968). Coining the term *Pygmalion effect,* Rosenthal and Jacobson (1968) provided evidence that teacher expectations can serve as self-fulfilling prophecies in student performance and behavior even if the initial expectation of the student is incorrect. Research in sport and physical education has provided some consensus for the mechanisms of this self-fulfilling prophecy (Horn, Lox, & Labrador, 2001; Martinek, 1996). First, the teacher forms an expectation or belief about a student based upon some characteristic observed; for example having a low expectation of performance for an overweight student. These expectations then influence the teacher's behavior toward the student; for example, the physical educator may provide the student a higher frequency of general positive feedback that is noncontingent on performance. Third, this noncontingent teacher feedback influences the student's cognitions, affect, and behavior, as the learner assumes he or she has no control over the type of feedback provided, which may result in less student persistence and achievement within the tasks. Finally, this resultant student behavior confirms the teacher's initial expectations and the self-fulfilling cycle continues (Martinek, 1996). Despite evidence of the influence of teacher expectation related to person cues on teacher and

student behavior in physical education, little is currently understood of how the person cue of being overweight influences physical education teacher behavior.

Anti-Fat Bias

Anti-fat bias has been defined as "…an obesity prejudice in which the attribute of being obese influences expectations about the individual, often in terms of negative character assessments such as laziness, lack of self-discipline, and incompetence" (Chambliss, Finley, & Blair, 2004, p. 468). Anti-fat bias can be studied at the implicit, explicit, and behavioral levels, and the dynamics of the potential relationship between the three are important to explore. Implicit biases are "associations and automatic preferences that exist beyond conscious evaluation, thereby providing a measure of bias of which people may be unaware or unwilling to report" (Chambliss et al., 2004, p. 469). Existing research has demonstrated significant implicit anti-fat bias in future exercise science professionals (O'Brien, Hunter, & Banks, 2007) as well as physical education teachers and majors (Fontana et al., 2013). In each of the studies, participants demonstrated a stronger tendency to associate fat people with the negative attributes of "bad" and "lazy" than the positive attributes of "good" and "motivated."

Explicit biases are conscious attitudes that a person has with respect to a certain group (Chambliss et al., 2004). Studies have found that future exercise science professionals possess explicit anti-fat attitudes. For example, Peters and Jones (2010) revealed that a group of students studying exercise science courses believed fat children would have poorer physical conditioning, body self-esteem, physical self-worth, sport competence, and global self-esteem than normal-weight children. Results of explicit anti-fat bias in physical educators have been more nuanced. Through a survey of NASPE physical educators, Greenleaf and Weiller (2005) documented that teachers expressed a neutral explicit anti-fat bias towards obese students; however, they also reported significantly lower expectations for those students in multiple physical performance domains (e.g., endurance, flexibility, and coordination) as well as overall general abilities (e.g., social interaction, cooperation, and reasoning).

Research examining the potential relationship between implicit and explicit biases has received less attention, with contradictory

findings between implicit and explicit anti-fat bias attitudes being common (e.g., Chambliss et al., 2004; O'Brien et al., 2007). For example, one recent study provided evidence that physical educators may have a pro-fat explicit bias even when reporting a strong anti-fat implicit bias toward overweight students (Fontana et al., 2013). These inconsistencies suggest that health care professionals, including physical educators, may attempt to overcome some of their negative subconscious anti-fat bias attitudes towards overweight students so as to not explicitly discriminate against those individuals. Clearly, further documentation of the strength of the relationship between implicit and explicit anti-fat bias is warranted.

Of primary importance is the need for studies that include a measure of actual anti-fat bias behavior. There currently exists a void of research that has examined the relationship between implicit or explicit anti-fat bias and teacher–student interactional behavior in a K–12 physical education setting. Teacher feedback is an example of an observable, student-initiated interactional behavior, with the greater use of positive, specific teacher feedback being associated with increases in student learning and levels of physical activity in physical education (Rink, 2010). Greenleaf and Weiller (2005) speculated that negative explicit attitudes about overweight children can inform the expectancy process, in which, "negative initial teacher impressions would in turn lead to lower performance expectations and less frequent and lower quality feedback" (p. 409). While it is logical to assert that existing implicit and explicit anti-fat bias may predispose a teacher to provide higher quality and more frequent feedback for students perceived as normal weight, that assertion remains unsubstantiated. Secondly, there exists little consistency in the demographics of participants included in the aforementioned research, with participants ranging from established physical education teachers to more general exercise science undergraduate majors; this factor limits the ability to draw precise conclusions about the former group. Given the unique role that physical educators have in teaching of physical skills and fostering lifelong physical activity, it is necessary to evaluate their anti-fat attitudes and behaviors as a distinct professional group.

Thus, the next logical step is to explore whether there is indeed a difference in the quantity and quality of feedback provided by physi-

cal educators toward individual students based upon (a) the teacher's perceptions of the student's weight classification (normal vs. overweight) and (b) the teacher's implicit and explicit anti-fat bias. To date, no research on the topic has conducted systematic observation to verify whether anti-fat bias is borne out as discriminatory behavior against individuals within the physical education setting. Until the presence and magnitude of discriminatory behavior is actually documented, the suggestion that education and interventions focused on anti-fat bias should be included within physical education preparatory programs is premature (e.g., O'Brien et al., 2007). As such, the primary aim of this study was to examine the extent to which anti-fat bias exists within a group of preservice physical educators and how this bias manifests in the quality and quantity of feedback provided to students perceived as normal and overweight within K–12 physical education. A secondary purpose was to qualitatively assess the preservice teachers' perceptions of differential behavior, potential consequences of that behavior, and strategies for eliminating such preferential treatment.

Method

Participants

Preservice physical educators were recruited from a physical education teacher education program at a public university in the USA. All the participants were in their final year of the undergraduate degree program and had a mean age of 23.6 years (SD = 2.8 years). Seventeen of the 18 preservice teachers reported themselves to be White/Caucasian, with the one remaining being of Hispanic/Latino ethnicity. All the preservice teachers were enrolled in a final-year secondary practicum experience. The practicum included teaching rotations through three 4-week sport-based units of instruction at the junior high (years 7 and 8) and high school (year 11) levels. After each 4-week unit of instruction the preservice teachers would rotate to teach a different class of students. Each preservice teacher taught coeducational classes of 20–25 students using the Sport Education Tactical Model (Pritchard & McCollum, 2009).

Procedure

Permission to conduct the study was obtained from the university's institutional review board. Upon receiving informed consent from the preservice teachers, each participant was asked to complete a demographics questionnaire detailing biological sex, age, race/ethnicity, self-reported height and weight, and questions related to his or her history of interactions with people who are overweight (e.g., personal weight history, number of family members and friends they perceive to be overweight). Chambliss et al. (2004) noted that ". . . personal experience with friends and family who are obese may lessen negative attitudes . . ." (p. 472), making this a potentially important moderating variable in understanding the hypothesized relationship between anti-fat bias and discriminatory behavior against overweight students. While only two of the participants (11.1%) reported being overweight or obese at any point in their lives, eight of the 18 (44.4%) had family members who were overweight or obese, while 12 of the 18 (66.7%) indicated they had friends who were overweight or obese.

Research Paradigm

This study employed a mixed-methods research design in which both quantitative and qualitative data were collected and analyzed to support the purposes of the research. Despite the epistemological and ontological complexities inherent in executing and conveying the results of mixed-methods approaches (Smith, Sparkes, Phoenix, & Kirkby, 2012), such a design was helpful in overcoming some of the contextual challenges present (e.g., maintaining an unobtrusive presence of the research team, not wanting to interrupt physical education lessons to interview teachers). More important, this approach allowed for both complementarity (adding to and finding similarities and/or differences in the results from each methodology) and initiation (generation of novel information related to the research questions; Moran, Matthews, & Kirby, 2011). Taken together, this overall approach is best considered a pragmatic paradigm that is justified when the appropriate philosophical considerations have been accounted for (Smith et al., 2012).

Measures

Prior to the start of the teaching practicum, all preservice teachers were asked to complete two measures: an implicit anti-fat attitude test (IAT) and an explicit anti-fat test (the Anti-Fat Attitudes Scale [AFAS; Morrison & O'Connor, 1999]).

Implicit Anti-Fat Attitude Test (IAT). The IAT was designed to examine social prejudices against different groups (Greenwald, McGhee, & Schwartz, 1998) through measuring the time participants take to categorize negative or positive attributes (e.g., "lazy" versus "motivated") with a particular group of people (e.g., "fat" or "normal weight"; O'Brien et al., 2007). It is believed that "People generally find the IAT tasks easier when the category pairing matches their attitude… and are able to correctly classify more words within the 20-s [sic] time" (Chambliss et al., 2004). Recently, the IAT has been used successfully to measure implicit anti-fat bias in preservice physical educators (Fontana et al., 2013).

Anti-Fat Attitude Scale (AFAS). This explicit measure of anti-fat attitudes contains five items: "On average, fat people are lazier than thin people," "Fat people are less sexually attractive than thin people," "Fat people have only themselves to lame for their weight," "I would never date a fat person," and "It is disgusting when a fat person wears a bathing suit at the beach." Individuals rate each item on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). The measure has demonstrated adequate reliability and validity (Morrison & O'Connor, 1999), including adequate internal consistency ($\alpha = .69$) as well as significant correlation with other measures of anti-fat bias (Greenleaf & Weiller, 2005). In the current study, the scale reliability for the AFAS was $\alpha = .86$.

Teacher feedback. At the start of each teaching rotation, the preservice teachers were provided a student roster and asked to classify each K–12 student in their class as normal or overweight. Objective measures of student fatness, such as BMI, were viewed as invasive and unnecessary, as it is the teacher's perception of the students' body shape that invokes her or his anti-fat bias. Each preservice physical educator was then live coded for an average of 10 class lessons over the course of the practicum, with each class lesson lasting either 30 or 60 min. As a result, the average total observed teaching time was 6.5 hr for each preservice teacher. During teaching episodes, trained

coders live coded the frequency and type of teacher feedback provided to specific students.

A specifically designed coding sheet was used to record the frequency and type of teacher feedback provided to individual students during lessons. The coding instrument was delineated based upon established categories of teacher feedback for event-recording observational systems (Rink, 2010). These categories included feedback context, target, level of specificity, and either positive or negative evaluation. The two primary contexts of feedback utilized within analyses included skill-related and behavior-related feedback. Once the context was established, the target group/individual was identified and the level of specificity determined. For motor skill feedback, specificity was categorized as either general or specific. Feedback was classified as general if it was evaluative but did not include information on the rationale for the judgment (e.g., "good job"; Rink, 2010). Specific feedback statements included some information on why the evaluation was made (e.g., "nice step with your opposite foot"). Student behavior, the second context of feedback, pertained to the management of learners within the tasks. Teacher behavior feedback statements were categorized as either a "praise," "hustle prompt," (urging the students to transition quickly to a new behavior) or a "desist" (stop a specific behavior).

Three research assistants were trained by the study authors to use the teacher feedback coding instrument. Through viewing video-recorded physical education lesson segments, the research assistants practiced correctly identifying and documenting the five specific teacher–student interactions of interest (general, specific, praise, hustle, desist). In comparison to the primary author, each observer demonstrated an interobserver reliability (IOR) greater than .90 before coding any live teaching episodes. The primary author coded 25% of all lessons observed by the assistant coders. The IOR between the primary author and each research assistant averaged .88, with a range of .84 to .95 for each category.

Statistical Analyses

Preliminary analyses. To explore the relationship between implicit bias, explicit bias, and the types of teacher feedback, the correlation between preservice teachers' implicit bias and explicit bias was examined first. Implicit bias values came directly from participants'

scores on their IAT (range 1–4, 1 = *no preference*, 4 = *strong preference for thin over fat*). Explicit bias values were calculated using a tertiary split of individuals' total scores on the AFAS. The category of "low explicit bias" included preservice teachers with an overall AFAS score between 10–14 ($n = 5$), and "moderate explicit bias" represented those with an overall AFAS score between 15–19 ($n = 7$) and "high explicit bias" included people with a total AFAS score of greater than 20 ($n = 5$). Spearman's rho correlation indicated no correlation between implicit and explicit anti-fat bias ($r = .000$, $p > .99$).

Because there was no significant correlation between implicit and explicit bias, two multivariate analysis of variance (MANOVAs) analyses were conducted to examine potential relationships between type of anti-fat bias, perceived weight status of a student, and type of feedback. The first was a 3 × 2 × 2 design (Implicit Bias Status × Perceived Student Weight Status × Motor Skill Feedback), and the second was a 3 × 2 × 3 design (Explicit Bias Status × Perceived Student Weight Status × Behavioral Feedback). Where statistically significant main and interaction effects were indicated, appropriate post hoc Tukey tests were subsequently conducted to determine which groups varied significantly from one another.

Qualitative analyses. Following the practicum, qualitative interviews with six of preservice physical education teachers were used to explore (a) whether they perceived engaging in differential behavior between overweight and normal weight children, (b) what perceived effects such disparate behavior might have on student learning and future physical activity involvement, and (c) potential strategies for preventing the expression of anti-fat bias in physical education settings. Four of the individuals had the highest level of implicit bias possible, while the other two had moderate implicit bias; two of the six also reported having moderate explicit bias. These semi-structured interviews (average length = 43 min) were audio-recorded and transcribed verbatim. Subsequently, both authors engaged in techniques consistent with descriptive thematic analysis, which is focused on recognition and description of common messages or ideas throughout one or more interviews (Vaismoradi, Turunen, & Bondas, 2013). This process followed a deductive approach, as responses provided to the three main research questions were examined for congruence and divergence between participants; meaning

units were subsequently collapsed into relevant themes based on similarity of use and frequency of occurrence.

Results

Descriptive Statistics

Based on the results of the AFAS, participants generally agreed that fat people aren't as physically attractive as thin people (M = 3.72, SD = .83) and that fat people are generally lazier than thin people (M = 3.56, SD = .98). However, preservice teachers were more neutral in relation to their belief that it is disgusting when a fat person wears a bathing suit to the beach (M = 3.28, SD = 1.18), the consideration of whether they would never date a fat person (M = 3.22, SD = 1.06), and the thought that fat people only have themselves to blame for their weight (M = 2.72, SD = .96). The overall mean score was 16.5 out of 25 (SD = 4.03), indicating a small explicit fat bias.

Table 1 provides the average frequency of feedback interactions per student per lesson during each length of lesson for the two motor skill categories observed (general, specific) and the three behavioral categories (praise, hustle, desist), as well as total interactions. Participants tended to give more performance than behavioral feedbacks during lessons. Nearly twice as many specific than general performance feedbacks were provided (i.e., M = 1.15 vs. M = .68/student/min in a 30-min lesson, respectively), and the number of praise interactions was much higher than hustle or desist behavioral feedbacks (e.g., M = .49 vs. M = .23 and M = .11/student/ min in a 30-min lesson, respectively).

Table 1
Frequency of Teacher Feedback During Physical Education Lessons

Behavioral category	Average (*SD*) interactions per student 30-min lesson	Average (*SD*) interactions per student 60-min lesson
General	0.68 (0.99)	1.9 (1.8)
Specific	1.15 (1.27)	2.7 (2.8)
Praise	0.49 (0.88)	2.2 (2.4)
Hustle	0.23 (0.55)	1.5 (2.2)
Desist	0.11 (0.45)	0.09 (0.33)
Total Interactions	2.65 (2.46)	8.4 (6.6)

Relationship Between Implicit, Explicit Bias, and Teacher Feedback

Implicit fat bias. In examining the relationship between implicit bias, overweight status, and overall number of feedback statements, there was a significant main effect for implicit bias category, $F(2, 3008) = 3.65$, $p = .026$. Post hoc tests indicated that preservice teachers with strong implicit anti-fat bias gave more feedback statements to students overall ($M = 3.16$/min) compared to teachers with moderate implicit anti-fat bias ($M = 2.69$, $p = .004$) and no implicit anti-fat bias ($M = 2.38$, $p = .004$). The main effect for overweight status was not significant, nor was there a significant interaction between implicit anti-fat bias and overweight status.

Similarly, in exploring whether general and specific feedback varied as a result of implicit anti-fat bias and overweight status, there was a significant main effect for implicit bias on general feedback, $F(2, 3004) = 11.87$, $p < .001$. Preservice teachers with strong implicit anti-fat bias provided more general feedback ($M = .98$) than those teachers with moderate bias ($M = .41$, $p < .001$) and those with no preference for thin compared to overweight ($M = .70$, $p = .003$). With regard to specific feedback, there was no significant main effect for implicit bias or overweight status, as well as no interaction effect.

Explicit fat bias. When explicit anti-fat bias was used in the analyses in place of implicit anti-fat bias to examine potential differences in the frequency of teacher feedback, there was a significant main effect for explicit bias, $F(2, 3004) = 7.09$, $p = .001$, as well as significant interaction effect for explicit bias and overweight status, $F(2, 3004) = 5.62$, $p = .004$. The interaction effect suggested that teachers with moderate or strong explicit bias provided more feedback statements to adolescents who are perceived to be normal weight than those teachers with low bias; however, teachers with strong bias maintain a higher number of feedback statements to perceived overweight students, while teachers with moderate or low bias decrease significantly in their interactions with overweight students.

In examining whether general and specific feedback were related to explicit anti-fat bias and overweight status, there was again a significant main effect for explicit bias in relationship to general feedback, $F(2, 3004) = 28.76$, $p < .001$, as well as a significant interaction effect for specific feedback and overweight status, $F(2, 3004) =$

12.01, $p < .01$. The interaction effect of explicit bias and overweight status showed that students who are perceived to be overweight tend to receive the same amount of specific feedback from teachers with strong explicit bias as those who have low bias; yet, teachers with a moderate explicit bias engage in less specific feedback with overweight students.

As for the relationship between explicit anti-fat bias, overweight status, and praise, hustle, or desist feedback, there was a significant main effect for explicit bias and praise, $F(2, 3004) = 3.977$, $p = .019$, as well as a significant main effect for explicit bias and hustle prompts, $F(2, 3004) = 6.58$, $p = .001$. Comparisons showed that students who are overweight tend to receive similar numbers of hustle prompts from teachers regardless of that participant's explicit anti-fat bias. However, children who are perceived as normal weight receive significantly more hustle prompts from teachers with moderate explicit bias than from those who have low or high explicit bias.

Qualitative Analyses

Before asking questions related to the three main topics of interest, each participant shared that the nature of the questionnaires completed before the teaching practicum provided an initial indication of what the research was about; they also indicated not thinking about the study past the first few lessons. Educators also reported it was easy for them to differentiate which students they perceived to be overweight versus normal weight. However, each participant recalled not being overtly attuned to the students' perceived overweight status, but focused on their pedagogy (i.e., delivering a good lesson) during teaching episodes instead. When asked if they engaged in the same relative frequency of interaction behaviors with overweight and normal weight students, many of the preservice teachers speculated they may have interacted more with the former; this was thought to be a result of the difference in the amount of praise and specific interactions between the two groups. In some cases, the praises given were purposeful in encouraging the perceived overweight children to continue engaging in the activity when it appeared difficult for them. For example, one participant shared, "I definitely gave more positives to some of the overweight kids just because I didn't want to break their spirits. I could see they couldn't keep up, so I just wanted to keep encouraging them, motivating them." As for specific feed-

back, most of the participants reported that a difference in such interactions would be solely based on ability level; specific feedback would be provided to keep challenging the student to improve regardless of weight status. Yet the preservice teachers who made this reflection also noted the relatively strong correlation between overweight status and skill level; as such, they thought they gave more specific feedback to overweight adolescents so they could continue to improve in the execution of their physical activities and continue advancing to the level of their peers.

With respect to the second qualitative point of emphasis, preservice teachers thoughts related to the perceived effects of differential feedback on student learning and future physical activity involvement clustered around effects on self-concept as well as actual behavior. While all interviewees believed they provided equitable opportunities to participate, most believed that overweight children didn't take advantage of such occasions as much as normal-weight learners; that is, they didn't engage in the target behavior as frequently, as shared by one educator in saying, "I noticed the overweight kids would stand back more, they didn't really get into the game as much." When asked why such behavior might happen, teachers speculated a link with children's potentially low self-concept. This thought was verbalized very specifically by one participant who mentioned, "For the most part they were less confident with themselves, they had a harder time interacting with the other students, they thought they were less skilled, and they weren't as happy about their appearance." Regardless of why physical activity participation might be lower for overweight students, such behavioral discrepancies were often experienced as emotionally challenging, as captured by a teacher who said, "I think you just get frustrated because you don't want them to lead that life, you really want to help them and make them healthy." Another implored, "You just want them to try… they don't have to be the best, but they need to give an effort, that's all."

Finally, related to the third qualitative area of attention, none of the preservice instructors indicated that the topic of teaching students who are overweight was specifically discussed in their preparatory classes. One educator clearly stated, "I don't remember any class that addressed overweight kids and strategies to help motivate them." While half of the participants thought it would be a good idea

to explicitly teach effective pedagogical techniques for effectively addressing categories of social difference (e.g., biological sex, race/ethnicity, body weight), the other half believed that successfully executing the pedagogical skills they were taught was enough to reduce (or even eliminate) any differential behavior across such groups. Such strategies included teaching a variety of activities, mixing groups effectively, and trying to develop the highest competency level in all learners they interact with regardless of any perceived social difference (weight status included). One interviewee also noted that beyond pedagogy, school policies such as a dress code that emphasizes loose, active clothing might mitigate some of the negative effects that result from how overweight students are perceived by their peers or instructors. Across interviews, it was evident that such strategies were seen as a way to provide an equitable experience for all students, as shared by one educator who suggested, "I just want them to be motivated, regardless of anything else such as their weight status. Anything can help."

Discussion

The primary purpose of this study was to objectively examine how implicit and explicit anti-fat bias differentially manifests in preservice physical educators' feedback interactions with K–12 students perceived as normal or overweight. The results of study reveal three key findings: (a) preservice teachers with stronger implicit and explicit anti-fat bias provided a higher frequency of general feedback to all students, irrespective of student weight status; (b) preservice teachers with moderate explicit anti-fat bias had a lower number of feedback interactions with overweight students and this feedback was more general and inclusive of behavioral hustle prompts; and (c) preservice teachers with low implicit and explicit bias provided equitable feedback frequency and quality to students across the different weight categories.

Greenleaf and Weiller (2005) speculated that negative explicit attitudes about overweight children can inform the expectancy process, in which "negative initial teacher impressions would in turn lead to lower performance expectations and less frequent and lower quality feedback" (p. 409). The results of this study suggest that the behavioral manifestation of anti-fat bias within the physical education setting is more complex than previously surmised. Preservice

physical educators with the highest levels of both implicit and explicit anti-fat bias provided the highest frequency of feedback to all students, irrespective of perceived weight status. This finding lends support to more recent research (e.g., Fontana et al., 2013), which suggested that physical educators may have a pro-fat behavioral intention even when reporting a strong anti-fat explicit bias towards overweight students.

This apparent contradiction may be hypothetically explained by the nature of physical education teaching as a "health care profession" and the operant inclusive philosophy that the physical educator is expected to adopt to facilitate the opportunity for healthy lifestyle choices for all students. Evidence from this study suggests the preservice physical educators with a strong implicit anti-fat bias may attempt to overcome some of their negative beliefs about overweight students by interacting with them often so as to not explicitly discriminate against those individuals. This assertion is supported by the commentaries of the preservice teachers who suggested that they focused on encouraging the perceived overweight children to continue engaging in the activity when it appeared difficult for them. This finding also highlights the complimentarity between the quantitative and qualitative data. When these subconscious anti-fat biases were also strongly explicit, interactions were often more positive and general in their level of specificity. Although intended to be nondiscriminatory, this pattern of teacher behavior may also promote a learned helpless self-fulfilling prophecy because it is noncontingent to student performance (Martinek, 1996). The resultant effect of noncontingent feedback may negatively influence overweight students' cognitions, affect, and behavior, as they assume that they have no control over the type of feedback provided, which may result in less student persistence within the tasks as noted by many participants in the interviews. This continued lack of engagement could ultimately provide a stimulus for the teacher's expectation and thus the emergence of a self-fulfilling prophecy.

Results of this study also suggest that preservice teachers who had a moderate explicit anti-fat bias had the lowest frequency of feedback interactions with overweight students that were more general and inclusive of behavioral hustle prompts. Although cautionary based upon the number of preservice teachers in this category,

this finding highlights the potential for discriminatory behavior that the stigma of anti-fat bias may present. For this specific subgroup of teachers, the student cue of being overweight may have elicited a level of explicit anti-fat bias that was sufficient to reduce the level of interaction with this population; yet the bias wasn't strong enough to manifest a strong pro-fat behavioral intention to overcome this conscious bias. This finding provides a novel insight into the potential complexity of the relationship between anti-fat bias attitudes and how they manifest in teacher–student behavioral interactions, contributing to the initiation attained through the mixed-method design. For these teachers, there existed some conscious anti-fat bias and a lower expectation for physical performance for overweight students. The resultant outcome was a reduction in teacher–student verbal interactions with the perceived overweight students that was predominantly composed of positive, general statements and hustle prompts. These positive, general statements are also often noncontingent on performance and as such set an expectation that the target students will be expected to simply participate, rather than necessarily achieve within the stated tasks as indicated by the participant who indicated "just trying" is a relative goal for overweight and obese physical education students.

Given this information, it is with this specific subgroup of preservice teachers that the potential for education and interventions focused on anti-fat bias may be warranted. If perceived anti-fat bias is present, but insufficient to activate a pro-fat philosophy of equitable behavioral interaction, then some education with this population on the interaction between diversity of children and the benefits and risks of different types of feedback may be required within the teacher preparation program. Reflections from several of the preservice teachers suggested that they would be in favor of such content and being educated on effective pedagogical techniques for effectively addressing categories of social difference (e.g., biological sex, race/ethnicity, body weight). However, several of the preservice teachers also reported resistance to this type of initiative suggesting that successfully executing the pedagogical skills they were currently taught in the program was sufficient to reduce any differential behavior across such groups. Future research in physical education teacher development might explore how such resistance develops and what

specific educational and behavioral strategies are effective at overcoming it.

The final key finding of the study revealed that preservice physical educators with the lowest levels of implicit and explicit anti-fat bias provided equitable frequency and quality of feedback statements to students across the different perceived weight classifications. Interestingly, these preservice physical educators were also among the few participants to report having being previously overweight in some point in their lives or had family members who were overweight. For these teachers, the person cue of overweight did not seem to stimulate a negative stigma with being overweight and operating effectively within a physical movement domain and thus did not yield implicit or explicit anti-fat bias toward those individuals. Although these individuals were not interviewed as part of the qualitative analyses, it could be surmised that these participants had a history of being successful in a physical movement environment, even though they may have perceived themselves as being overweight. The resultant outcome was that a stigma of being overweight was not viewed as having maladaptive consequences for their control of physical activity behavior and thus their interactions were equitable across this perceived social difference.

Despite the potential veracity of the findings of this study, its design is not without its limitations, and some caution should be applied to their generalizability. First, to understand the impact of different frequencies and quality teacher feedback on student motives for engagement and achievement in physical education, research methodologies that access the student's perspectives of the feedback received are required. Future studies should include student perspectives of this teaching dynamic to gain greater insight on how, for example, higher frequencies of noncontingent feedback are perceived. Second, the number of students perceived as being overweight within each class group was relatively low (less than 20%). This minority population may have the potential to skew not only the degree of explicit anti-fat bias that the preservice teachers report, but also the relative frequency of feedback interactions. Future research that replicate the design of this study within contexts that have higher representations of overweight students more consistent with national youth obesity trends would provide more generality to the

relationship between level of anti-fat bias and teacher–student interactional behavior espoused within this study. Finally, caution should applied to the assertion that the person cue of being overweight was the sole stimulus for teacher feedback responses. As reflected by several of the preservice teacher participants, the more powerful cue for the type and frequency of feedback statements provided may have been the perceived skill level of the individual student. Despite the potential association with the students' weight status, this claim may be an oversimplification of the person cues that elicit specific teacher responses and this dynamic warrants continued investigation.

Despite the aforementioned limitations, the results of this study provide a valuable addition to the extant literature on the role of anti-fat bias on sport pedagogy behavior. First, from a theoretical perspective, the expected association between implicit and explicit anti-fat bias did not emerge. In such cases, assessing explicit attitudes is likely the better indicator for how such a preference may impact teacher–student behavioral interactions within K–12 physical education settings. Second, from a practical perspective, it seems pertinent for preparation programs to facilitate practicum experiences that afford opportunities for preservice teachers to interact with students across all categories of social difference. These experiences should include active self-reflections on their interactions with the diversity of students based upon categories such as gender, motor ability and body type. Such reflections would serve to enhance their pedagogical self-awareness and ultimately shape future interactions with a population that is becoming more diverse. Finally, methodologically, this mixed-methods research realized the benefits of initiation and complimentarity possible in such designs even with the paradigmatic complications present. While it seems many preservice physical educators adopt a pro-fat, equitable philosophy in their interactions with perceived overweight students, every effort should be made to reduce societal biases that may ultimately impact the desired learning outcomes of a physical education program.

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HEALTH

Teaching Physical Literacy to Promote Healthy Lives: TGfU and Related Approaches

Ashley Doozan and Mihae Bae

Abstract

The knowledge acquired in physical education classes should provide for an increase in physical activity and promote interest in healthier lifestyles. Despite the importance of physical literacy developed in physical education classes, physical education is not perceived as important, and funding for physical education has decreased. This paper highlights the importance of physical education on the development of competent, confident students by reviewing instructional approaches: The Teaching Games for Understanding approach and its derivatives. Teaching Games for Understanding (TGfU) can contribute to critical thinking, autonomy and classroom skills as well as better understanding of physical activity and its importance for physical literacy when compared to traditional physical education methods. Multiple research studies are discussed in this paper to illustrate how TGfU can holistically increase a student's ability to perform in academic classes as well as in physical education. These studies can help present a strong argument for the support of funding physical education programs and the recognition of physical educators.

Ashley Doozan is a graduate student in the Department of Health & Kinesiology, Lamar University. Mihae Bae is an assistant professor in the Department of Health & Kinesiology, Lamar University. Please send author correspondence to mihae.bae@lamar.edu

Although the ancient Greeks considered it a primary necessity, physical education is not a priority in our time. In fact, funding for physical education and time for physical education and recesses have all been cut back (Richardson, 2011). The School Health Policies and Programs Study conducted for the Centers for Disease Control and Prevention (2008) found that "only 3.8% of elementary schools (excluding kindergarten), 7.9% of middle schools, and 2.1% of high schools in the United States provided daily physical education or its equivalent for all grades in the school for the entire school year" (Lee, Burgeson, Fulton, & Spain, 2007, p. 459). Some reasons for these omissions are that schools are focusing on funding academic core classes, and physical education is not considered part of the academic core. These budgets are being cut even though research has shown that attending physical education classes directly relates to better academic performance (Bae & Ennis, 2014; Ennis, 2014) and attitude towards school (Ennis, 2014; Richard, 2010; Richardson, 2011). In certain worst-case situations, physical activity is occasionally used or perceived as a punishment, especially for students who are not athletically inclined. In one school, a new physical education teacher was instructed, "So long as there is control and the children seem happy, no one really minds (what happens in PE)" (Light & Butler, 2005, p. 250). This is a very common concept, and many academic teachers, especially elementary school teachers, see physical education class as a time for them to get a break from their kids in the classroom, rather than an educational opportunity for their kids (Ennis, 2006, 2014; Placek, 1983).

These circumstances require that physical education teachers be strong in their conviction of the importance of their work and the benefit to the students (Ennis, 2011, 2014; Rink, 2013; Rovegno & Bandhauer, 2013). They must be highly qualified with solid knowledge, including pedagogical content knowledge (Rovegno, 1998; Ward, 2013), so they are able to use a variety of curricular models that help students learn (Ennis, 2011, 2014; Metzler, 2000; Rink, 2014).

Quality of Teaching

Research on student learning has indicated the importance of quality of the teacher (Ennis, 2014; Lindsay, 2014; Rink, 2013) because the teacher's knowledge and educational beliefs influence not

only the selection for curriculum (Pajares, 1992; Prawat, 1992), but also the way the teacher implements a curriculum and refers to instructional methods, tactics, and strategies for the students (Bae & Ennis, 2014; Lindsay, 2014; Ennis, 2014). The following section has three parts: presentation of TGfU as an instructional model, benefit of the approach, and the effectiveness of the approach in developing students who are physically literate (National Association for Sport and Physical Education [NASPE], 2013; Society of Health and Physical Educators [SHAPE], 2014).

Teaching Games for Understanding: An Effective Instructional Model

Many curricular models have been developed for physical education teachers (Ennis, 2006, 2014; Rovegno & Bandhauer, 2013). TGfU is an instructional model which focuses on examining content area and learning outcomes (Ennis, 2014; Metzler, 2000). Programs based on this model involve the same focus. According to Ennis (2014), "The Teaching Games for Understanding family of models provides a physically active context for problem posing and problem solution that permits students to think deeply about performance options and apply knowledge to achieve meaningful solutions"(p. 8). TGfU is a tactical approach which was first proposed in 1982 by Bunker and Thorpe. Unlike the traditional technique-oriented approach that focuses on skill drills which are still very frequently observed in school in the United States, TGfU contributes to improving decision making ability for play within game contexts (Butler, 2006; Mitchell, Oslin, & Griffin, 2013) by providing for development of game appreciation and tactical awareness (Kirk & MacPhail, 2002; Werner, Thorpe, & Bunker, 1996). Having students improve skills and tactics in small-sided games can help them transfer learning from one game to another (Hopper, 2003; Light, 2004; Mitchell et al., 2013). This original model created by Bunker and Thorpe has inspired many iterations. In the following section, three among those iterations will be briefly described, along with the Game Performance Assessment Instrument (GPAI). The three major derivative approaches are Tactical Games approach, Game Sense, and the Invasion Game Competency model.

The tactical games approach. This approach took the six-step teaching from TGfU and simplified it into three steps (Kirk & MacPhail, 2002; Mitchell, 1996). This approach helps students understand the relevance of the connection between skills and tactics by providing them with the opportunity to explore a game form that presents a tactical problem requiring the use of particular skills (Mitchell, 1996; Mitchell et al., 2013). The teachers create game forms that require that students solve tactical problems by finding appropriate skills. The forms enable students to appreciate the value of skills, and also provide an opportunity for them to practice skills and develop tactical understanding in game situations (Werner et al., 1996). As students continue to practice, teachers can individualize the instruction by modifying the game form, adjusting the complexity of tasks in relation to a specific tactical problem (Mitchell et al., 2013). Improved skills and tactical understanding allow students to develop a deep understanding of movement patters in an invasion games category (Rovegno, 2010; Rovegno & Bandhauer, 2013). Therefore, this tactical games approach contributes to students' overall game performance.

Game sense approach. An emerging field of coaching in Australia utilizes this approach, combining specific technical, tactical and fitness training in a game practice (Light, 2004; Stoltz & Pill, 2014). It focuses on creating game-like situations that enable participants to indirectly experience what would be seen in a real game (Light, 2004). This approach is also based on TGfU but refines it to create a central focus for developing critical thinking skills while playing games. Since the game sense approach enables the players to read game situations with regard to offensive and defensive strategies, they can improve their decision making ability to solve problems presented in game context and develop independence or autonomy on the field (Light, 2004; Light & Robert, 2010). However, unlike other iterations of TGfU, this approach requires that the players be taught technical and tactical skills at the same time rather than taught using steps (Light, 2004).

Invasion games competency model. The third iteration is the Invasion Games Competency Model (IGCM). This model focuses on the development of decision making abilities through participating in invasion games (Tallir, Musch, Lenior, & Valcke, 2009). Players in

the model progress through modified games which involves game-like activities, in a developmentally appropriate sequence which grows in complexity. According to Tallir et al. (2007), each lesson begins with a specific game situation set up by the instructor and an introduction game is presented for that situation. The teacher begins by introducing the most essential skills and tactics necessary to play the game, designing some game-like tasks to help students make appropriate decisions (Tallir et al., 2007). Players learn to participate successfully in sport related modified invasion games that enable them to select solutions to problems. In the IGCM, students are assessed on key aspects of playing basic game forms (BGFs) and on performing nonplaying roles related to the basic form being played.

The game performance assessment instrument (GPAI). The GPAI was developed to evaluate game performance (Mitchell et al., 2013; Oslin, Mitchell, & Griffin, 1998). It was designed to measure selection and application of appropriate skills that demonstrate understanding and ability to find the solutions to tactical problems within game context (Mitchell et al., 2013; Oslin et al., 1998). Given that the enhancement of game performance is the goal of game teaching, the GPAI provides the opportunity for teachers to effectively assess what was being taught and what their students were learning in game-oriented physical education classes. In addition, it provides educators with a means of thinking more broadly about teaching games based on analyses of individual game performance components and overall performance (Oslin et al., 1998). The GPAI measures both on-the-ball movement and off-the-ball skills. By measuring the total involvement in the game, including supporting, adjusting, and covering, the GPAI encourages all levels of students to actively participate in game play (Mitchell et al., 2013). Therefore, the GPAI contributes to enhancing students' comprehensive understanding of game performance (Mitchell et al., 2013; Oslin et al., 1998).

In short, when one of these three iterations of TGfU is effectively taught and implemented, students learn to appreciate the value of skills and to understand the necessity of tactical understanding within the game context. That is, these iterations are all designed to provide the opportunity for students to develop a broad range of executive skills and appropriate movements, enabling them to make decisions necessary to solve tactical problems (Light, 2004; Richard,

2010; Storey & Butler, 2013). Furthermore, the GPAI helps every student continue to develop skillfulness, competence, and confidence by measuring all aspects of game performance (Mitchell et al., 2013; Oslin et al., 1998). Therefore, students are able to continue to develop their ability to become physically literate individuals who enjoy physical activities and the health benefits that activity provides (Mandigo & Corlett, 2010; NASPE, 2013; SHAPE, 2014).

Educational Benefits of Implementing Diverse Iterations of TGfU

Studies support that effective instructional models contribute to fostering student learning (Ennis, 2014; Metzler, 2000; Rovegno & Bandhauer, 2013). When it comes to self-efficacy, one exception is the Harrison study, which found that self-efficacy improved in both the skill instruction group and the tactical instruction group (Harrison, Blakemore, Richard, Oliver, Wilkinson, & Fellingham, 2004).

Harrison et al. (2004) did a study that showed that using a tactical method of teaching such as TGfU does in fact increase self-efficacy. However, self-efficacy also increased in the skill instruction group. In their study, 182 students in a beginning volleyball collegiate class met 2 days a week for 16 weeks. They were divided into a skill instruction group and a tactical instruction group. At the end of the 16 weeks, there was an analysis of the students' game play, skills, self-efficacy skills, and attitude to the lessons. Overall, they found that self-efficacy improved significantly in both groups.

Other findings, however, confirm that teachers or coaches who are equipped with knowledge related to TGfU are able to maximize the effect of curricular models on student learning (Butler, 2006; DeSouza & Mitchell, 2010; Storey & Butler, 2013). In this section, some educational benefits will be discussed in relation to the TGfU model.

Critical thinking. Critical thinking in physical education is defined by Lodewyk (2009) as "reflective thinking that is used to make reasonable and defensible decisions about movement tasks and challenges" (p. 12). Critical thinking can be divided into two parts, internal and external (Lodewyk, 2009). Internal thinking is the mental aspect of decision making, or the questions that the students ask as they internally process the information (Kirk & MacPhail, 2002;

Light, 2004). After internal thinking comes external thinking, or the actions and decisions that the athlete chooses to act out. Both internal and external thinking can be learned and are not dependent on the student's intellectual ability. Developing critical thinking is associated with academic qualities and skills such as creativity, reasoning, problem solving, mindfulness, and reflective judgment (Light & Robert, 2010; Lodewyk, 2009; Rovegno, 2010). The development of critical thinking ability enables students to use knowledge that they have and meaningfully integrate it in their memory (Hopper, 2003), allowing them to become more mentally and motivationally engaged in solving problems (Lodewyk, 2009; Rovegno, 2010).

TGfU and game methods derived from this concept are great methods to develop problem solving skills and critical thinking skills (Gray & Sproule, 2011; Harrison et al., 2004; Harvey, Cushion, Wegis, & Gonzalez, 2010; Lodewyk, 2009). Because TGfU is focused on the student as the center of learning (Butler, 2006; Richard, 2010), the students make their own decisions and are able to think about the actions they need to make (Hopper, 2003; Kirk & MacPhail, 2002). Harvey et al. (2010) conducted a study on American high school soccer players that looked at the performance of 18 varsity players and 16 first years in a 3 v 3 small-sided soccer games. Two coaches coached eight sessions lasting 40 to 60 min, using the TGfU approach. After the intervention, the varsity players made more appropriate and correct adjustments, and the first-years also made more appropriate adjustments when compared to baseline. Overall, Harvey et al. (2010) assumed that increases in appropriate actions or reductions in inappropriate actions were due to changes in decision making and skill execution. Their interpretation was that using TGfU as a coaching method allowed for faster responses and quicker reactions within the game environment off the ball, therefore improving the player's appropriate responses.

There have been other studies similar to Harvey et al. (2010) with similar results (Gray & Sproule, 2011; Tallir et al., 2009). Gray and Sproule (2011) had 52 secondary school participants that were divided into a skills method group, and a tactical teaching games approach method group. Both groups participated in 5-week blocks of classes that had lessons working toward performance in 4 v 4 basketball games. The students were videotaped and also filled out

a questionnaire at the end of study. After analysis of the tapes and questionnaires, the researchers found that postintervention those students who were in the teaching games approach method group showed significant increases in decision making and better support off the ball. There were no significant differences found in skill levels in the students between groups. Tallir et al. (2009) also divided participants into two groups, a traditional group and an Invasion Game Competence Model. This study lasted 12 weeks, during which the students participated in 12 sessions lasting 50 min. Students' learning was evaluated by taking a decision-making test and a memory test. The researchers found that there was a significant improvement in memory and decision making for both groups from preintervention. However, the IGCM showed a greater improvement in decision making at the intermediate test than the traditional skill group (Tallir et al., 2007). Both Gray and Sproule (2011) and Tallir et al. (2009) concluded that using a TGfU-based model improved the students' critical thinking skills as well as the efficiency at which they obtain these skills. Critical thinking and efficient decision-making skills can be developed during healthy activity in physical education based on the TGfU model (Hopper, 2003; Lodewyk, 2009; Rovegno, 2010).

Autonomy and self-efficacy. Along with developing better critical thinking skills (Light & Robert, 2010; Lodewyk, 2009), participating in sports and physical education helps develop a student's autonomy and self-efficacy (De Souza & Mitchell, 2010; Light, 2004). The idea of self-efficacy comes from Bandura's (1997) social cognitive theory and is defined as the perception of one's ability to successfully perform a particular behavior (Block, Taliaferro, Harris, & Krause, 2010). Autonomy is the perception of choice and control over a specific situation (Perlman & Webster, 2011). Both self-efficacy and autonomy are influenced by the motivation of the person, with the highest and most beneficial motivation being intrinsic motivation (Bandura, 1997; Block et al., 2010; Perlman & Webster, 2011). For students to develop these characteristics, communications must reassure students that their decisions as learners can be utilized (Perlman & Webster, 2011). Communication that honors the ideas of the students is exactly what TGfU provides, because the method is focused on the student and not the teacher or the coach (Kidman & Lombardo, 2010; Mitchell et al., 2013).

Perlman and Webster (2011) describe five behaviors that are parts of autonomy-supportive teaching. Three of these behaviors fit with the ideas of TGfU, and the other two can be easily added to a teacher's lesson plans. The first behavior Perlman and Webster describe is that the teacher nurtures inner motivation by making learning experiences more personally relevant and rewarding. TGfU is based on games that are developed around the students' social and cultural backgrounds and experiences. These small-sided games are more enjoyable and are more relatable than skill drills; therefore, students are more motivated to participate (De Souza & Mitchell, 2010; Mitchell et al., 2013). The other two aspects that help develop autonomy are the provision of explanatory rationales for rules or methods and the use of informational, noncontrolling language (Perlman & Webster, 2011). These ideas are actually taken a step further in the TGfU method. A very important aspect of TGfU is that during play or after a game, questions are asked that involve critical thinking (Hopper, 2003). These questions not only provide explanatory rationale but also allow the students to develop their own solutions (Hopper, 2003; Storey & Butler, 2013). When using TGfU, teachers do not give direct instruction, but ask prompt questions that help the students or athletes decided which tactic would be the best in a specific situation (Light, 2004; Richard, 2010). This not only develops autonomy but also self-efficacy because the power of finding the solution is given to the student, and the teacher is there to support and give encouragement while they develop the solution (Block et al., 2010; Richard, 2010; Rovegno, 2010).

Transfer and assessment. Critical thinking skills, autonomy, and self-efficacy are important in academic classrooms, but they can be developed while participating in physical education and sports. The application of TGfU concepts and strategies need not be limited to physical education classes. In academic classes, TGfU can promote individual learning, create an atmosphere of constructive cooperation and competition without set performance expectations and allow for the student to be self-assessing on their knowledge (Mitchell et al., 2013; Richard, 2010). For example, in a game context, students are required to identify tactical problems, gather information about the problems, and make an appropriate decision after pondering possible outcomes. This process encourages students to collaborate

effectively to solve problems. In fact, games can increase the enjoyment of learning a specific topic as well as increase the likelihood that the students grasp patterns and generalizations about the subject (Henderson & Foster, 1976; Wiersum, 2012).

Traditionally, the assessment of physical education is focused on managerial performance (attendance, punctuality and dress) and participation in the activities (Richard, 2010). However, there are no clear expectations for the students when grading this way (van der Mars & Harvey, 2010). This type of assessment is one of the reasons why physical education is not seen as an educational class or as part of a core curriculum. However, TGfU allows for an assessment system that coincides with a traditional academic assessment (Storey & Butler, 2013). Educators are promoting a shift from an "assessment of learning" to an "assessment for learning" and physical education can benefit from this change (van der Mars & Harvey, 2010). Assessment for learning focuses on the students and helps provide feedback for students on their progress (Richard, 2010; Rink, 2013). TGfU does this by allowing for assessments that can fit into a rubric, much like a normal academic class (Mitchell et al., 2013; Richard, 2010).

Henderson and Foster (1976) performed a study using a game to teach national policies to students in an American government course at a University. The students were divided into a traditional teaching lesson group and a games lesson group. The traditional lectures were given over a 4-week period and the games lecture was two, 2-hr lectures after an all-day session playing a relevant game. What Henderson and Foster (1976) found was that using games increased students' enjoyment of the course as well as their ability to understand the concepts they were learning.

Wiersum (2012) also did a similar study using multiple games in mathematics. The researcher took four different types of game situations and evaluated how students participated and learned from these games. From this study it was found that there was an increase in enthusiasm and interest in math in part due the fact that there was an increased understanding of the subject (Wiersum, 2012).

Development of Physical Literacy

Physical literacy is defined by Margaret Whitehead (2007) as "the motivation, confidence, physical competence, understanding,

and knowledge to maintain physical activity at an individually appropriate level, throughout life." As addressed earlier in this paper, TGfU not only develops critical thinking and understanding but also enables students to meet requirements for physical literacy because it involves using a student-centered approach to learning (NASPE, 2013; Richard, 2010). Furthermore, TGfU also helps to fill a gap that is often forgotten during physical education or sports. Physical literacy is described in SHAPE America (2014) as "a person who is physically literate is able to recognize the value of physical activity for health, enjoyment, challenge, self-expression, and or social interaction." Unfortunately, there are those who believe that physical activity alone is the primary goal for physical education and consider it nonintellectual and nonacademic (Ennis, 2011, 2014; Placek, 1983). They ignore the potential for achieving instructional goals that contribute to physical literacy. However, if physical education includes critical thinking skills, autonomy, and self-efficacy, and an increase in physical literacy, these negative connotations disappear. Furthermore, unlike physical activities and skills, physical literacy involves knowledge that can be assessed on standardized tests, so it can be compared to the core curriculum.

Education is an ongoing process of interpersonal interactions between the teacher and students and among students within a given educational environment (Bae & Ennis, 2014; Noddings, 1992). TGfU is centered on using games for teaching and provides for structured interactions among students to handle challenges or solve tactical problems (Mandigo & Corlett, 2010; Richard, 2010; Stoltz & Pill, 2014). Fry, Tan, McNeill, and Wright (2010) did a study on 297 primary school age children who participated in seven to 12 lessons taught using a game-based method. They evaluated the students using an open-ended questionnaire that compared the game-based method to their past experience with physical education. What the authors found was that over 90% of the students preferred the game method to their other physical education experiences. In fact, the students displayed heightened interest and engagement in learning, increased game skills and tactics as well as finding a higher value in physical activity (Fry et al., 2010; Mitchell et al., 2013; Richard, 2010).

Wallhead and Deglan (2004) and Light and Butler (2005) found similar results in their studies. Wallhead and Deglan (2004) found

that there was a significant increase in mean level of enjoyment and perceived competence after the students participate in a unit that was taught using a tactical games approach. They concluded that because there had been a positive relationship between perceived competence and continued participation in physical activity, tactical games might have the potential to motivate students to continue physical activity outside of school (Wallhead & Deglan, 2004). After interviewing four preservice and early career teachers, Light and Butler (2005) found that when these teachers used TGfU there was an increase in respect from other academic teachers as well as increased enjoyment in physical education. One of the participants stated that one fourth grade student was overheard saying she "used to really hate PE class, but now she loves it" after TGfU was implemented in her class (Light & Butler, 2005, p. 205).

The development of critical thinking, autonomy and self-efficacy helps create physical literacy (NASPE, 2013). Students who are physically literate will take ownership of their learning. Therefore, these students will be more likely to participate in physical activity throughout their lives (NASPE, 2013; SHAPE, 2014).

Conclusion

Physical education is important for the development of well-rounded holistic students. For physical education to move forward and to be able to assert its importance in the academic world, Teaching Games for Understanding or variations of this model can make a definite contribution. Student who are taught using the TGfU model are found to be more autonomous, critical thinkers who can apply the knowledge and strategies that they have learned in physical education to the challenges that they may face in other academic subjects and in life. They also have a better understanding of themselves and have developed stronger intrinsic motivation: in short, they become physically literate. As physically literate individuals, students are intrinsically motivated to stay physically active throughout their lives and share the joy of physical activity with others. Therefore, an increase in physical activity based on the knowledge acquired in physical education classes can provide for healthier lifestyles.

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PEDAGOGY

Effects of Teacher-to-Student Relatedness on Adolescent Male Motivation in a Weight Training Class

Zack Beddoes, Keven Prusak, David Barney, Carol Wilkinson

Abstract

The purpose of this study was to determine if the motivational profiles of male junior high weight training students differ across levels of teacher-to-student relatedness. One hundred and sixty six students participated in one of two units of instruction. Contextual motivation was measured using the Sport Motivation Scale II–Physical Education (SMS II–PE). Situational motivation and relatedness measurements were assessed using the Situational Motivation Scale-Physical Education (SIMS–PE), Amotivation Inventory–Physical Education Scale (AI–PE), and the Interpersonal Behavior Scale (IBS). Results revealed that situational motivation was not affected by the intervention in either group. Significant differences were observed in students' contextual motivation. That is, both within-groups' contextual motivation increased. Though the intervention did not reveal significant differences in students' situational motivation, it may confirm the complimentary nature of relatedness and autonomy constructs in fostering student self-determination in a physical education setting.

Zack Beddoes is a PhD student in the Department of Education in Curriculum and Instruction, Physical Education Teacher Eduaction at The University of Texas at Austin. Keven Prusak is a professor in the McKay School of Education at Brigham Young University. David Barney is an associate professor in the McKay School of Education at Brigham Young University. Carol Wilkinson is an associate professor in the McKay School of Education at Brigham Young University. Please send author correspondence to zack.beddoes@gmail.com

Perhaps the most critical element in any educational setting is the teacher who creates the learning environment, designs and delivers the learning activities, interacts with individual students, and hopefully is successful in facilitating greater student achievement. Creating a motivationally sound environment has been shown to increase student motivation toward academic activities as well as student learning outcomes (Ames & Archer, 1988; Standage, Duda, & Ntoumanis, 2005). When capable teachers provide a positive, supportive learning environment and activities, students tend to internalize the value and intent of the academic activities and greater performance, cognition, and affect accompany the experience (Pelletier, Fortier, & Vallerand, 1995). The nature of teacher-to-student support, then, becomes an invaluable tool to effectively create such learning environments and are the central focus of this study. Self-determination theory (SDT) of motivation will provide the framework for this examination of the effects of teacher-support in an academic setting, specifically in physical education (PE).

Self-determination Theory of Motivation

Self-determination theory (Deci & Ryan, 1985) has been used over the past three decades to describe a large variety of motivational phenomena and contexts. In its broadest sense, SDT makes several postulates: (a) humans have innate social needs to seek a sense of competence, autonomy, and relatedness, in a task; (b) motivational indices lie on a continuum of constructs from amotivation (the absence of motivation) through various levels of extrinsic behaviors to intrinsic behaviors; (c) as the social needs of autonomy, competence and relatedness are fulfilled, motivation becomes more internally regulated (self-determined); and (d) as these needs are met and maximized within social contexts, self-determined behavior is fostered and manifested in increased cognition, affect, and behavior (Deci & Ryan, 1985; see Figure 1). In addition, SDT operates within three separate levels of generality. The first level is *situational* which accounts for the current state of being or doing. The second, *contextual*, includes life domains such as education or sports. The third, *global*, encompasses personality or life traits. Global is considered to be the most generalized while situational the most specific (Vallerand, 2007; see Figure 1). Global dispositions are also consid-

ered to be the most stable and enduring life traits or attitudes, which guide adult behavior.

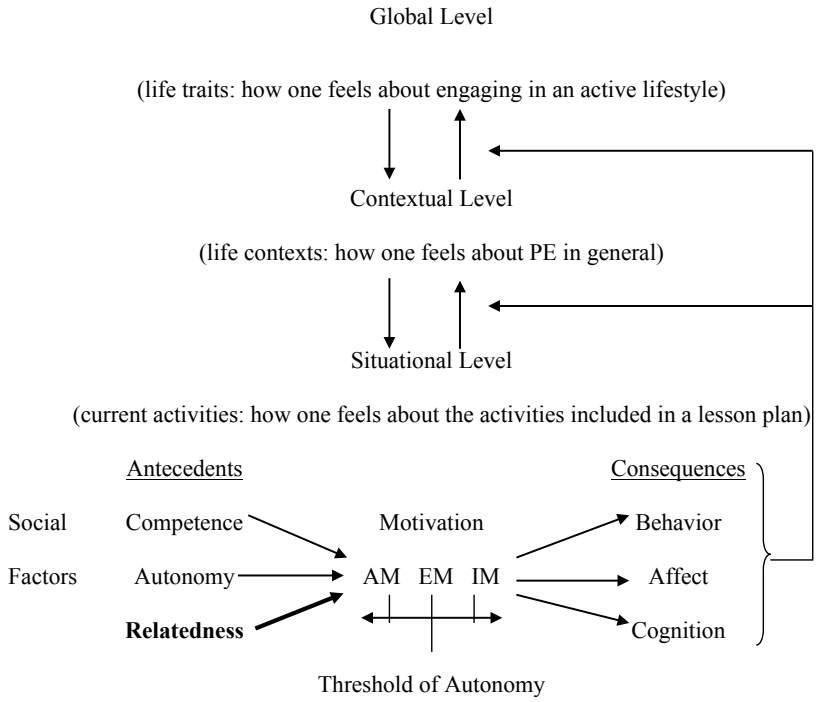

Figure 1. A description of the self-determination theory continuum along with situational,contextual, and global levels of generality. Adapted from "The Effects of Choice on the Motivation of Adolescent Girls in Physical Education," by K. A. Prusak, D. C. Treasure, P. W. Darst, and R. P. Pangrazi, 2004, *Journal of Teaching in Physical Education, 23,* p. 20.

Contextual dispositions are the next most stable and operate within a particular context such as sports or school domains such as physical education. Situational dispositions are the least stable and therefore most malleable and relate to the activities with which one is currently engaged(e.g., the daily physical education lesson plan). The model further posits top-down as well as bottom-up effects (Guay, Mageau, & Vallerand, 2003), which, when in operation between levels of increasing generality, manifest their effects only after repeated and consistent occurrence. In other words, one's contextual moti-

vation (such as feelings toward physical education) can be altered either positively or negatively, but only after repeated and consistent situational effects are experienced. Conversely, it can, for good or bad, exert its own top-down effects on the situational motivation of students in daily physical education. Thus Prusak et al. (2004) posit "this hierarchical framework [may allow] for a refined examination of whether daily practices in physical education lesson plans (i.e., situational) do indeed develop favorable attitudes toward physical education (i.e., contextual) and then toward choosing a physically active lifestyle (i.e., global)" (p. 21).

The Multidimensional Nature of Self-Determined Motivation

Amotivation is the least autonomous (self-determined) form of regulation because amotivated individuals either do not engage in the activity or engage without internalizing reasons for participating in the activity. Until recently, amotivation has been viewed as a unitary construct while extrinsic and intrinsic motivation have long been viewed as multidimensional. Extrinsic motivation (EM), for instance, is represented by four constructs including external regulation (the most controlled or least autonomous form of motivation). External regulation is driven primarily by coercion, fear of punishment, or hope for reward. For example, a child is externally regulated when she cleans her room because she fears being punished or perhaps to earn playtime. Next along the continuum is introjected regulation, which involves "taking in but not accepting a regulation as one's own" (Deci, Vallerand, Pelletier, & Ryan, 1991, p. 329). A student regulated by introjection goes to physical education for the sake of not letting down one's team or classmates—a form of coercion—or due to pressure-tension resulting from responsibilities beyond self. Next is identified regulation in which the individual values the behavior for himself or herself but only as a means to an end. For example, a person participates in swimming lessons because swimming is perceived as a useful skill at some future time. Integrated regulation is the most autonomous of the four EM constructs and involves fully embracing motives that once were external in origin. If a person is motivated by integrated regulation, he or she may conclude that "this is who I am." It is adjacent to intrinsic motivation (IM) because both are self-regulated. A major distinction is that "intrinsic motivation is characterized by interest in the activity

itself, whereas integrated regulation is characterized by the activity's being personally important for a valued outcome" (Deci et al., 1991, p. 330). Internally motivated individuals, on the other hand, engage in an activity for the pleasure they derive from the activity itself.

Amotivation in education. Considering the time and monetary investment in the education of children, educators are constantly concerned with how to motivate students (Pintrich, 2003) in order to maximize learning outcomes. For instance, "in their formative first two decades, individuals spend about 15,000 hours in schools. Thus schools represent a primary socializing influence that has enormous impact on the course of people's lives and, in turn, on society" (Deci et al., 1991, p. 325). Not surprisingly, lower school drop-out rates and positive academic performance have been reported when highly self-determined motivational profiles are achieved (Pintrich & de Groot, 1990). Nevertheless, studies reveal an increasing number of high school students lack volition (i.e., students are increasingly amotivated) in educational pursuits (Legault, Green-Demers, & Pelletier, 2006).

Amotivation is the least studied but perhaps the "most concerning form of motivation, due to various negative mental, physical, and affective outcomes" (Perlman, 2010, p. 433). Perlman (2010) suggests that the paucity of studies on amotivation is, in part, due to the reluctant nature of amotivated students toward participation, making it difficult to conduct meaningful examinations and attain enough data from which to draw conclusions that inform practice.

Legault et al. (2006) suggest that understanding the causes and remedies for an increasingly amotivated student population ought to be of paramount importance to educational researchers. To this end, they propose that rather than amotivation being viewed as unidimensional, it should instead be viewed as multidimensional (Legault et al., 2006). Building upon earlier work of Pelletier, Dion, Tuson, and Green-Demers (1999), Legault et al. (2006) pose four subtypes of academic amotivation based upon ability beliefs, effort beliefs, value placed on the task, and characteristics of the task. Ability beliefs describe students who do not believe they are competent at a task and therefore are likely to disengage. Effort beliefs describe students who lack the desire to invest the energy necessary to complete the task, although they may in fact be competent at performing the task. Some students simply do not value the task enough to engage.

Still others find the characteristics of the task unappealing finding little pleasure in their performance.

Social needs support in PE. Competence support is fostered by teachers conveying information in a way that the student feels competent (capable) of completing the class requirements. Autonomy support is fostered "when students feel a sense of choice and personal control in a task" (Prusak et al., 2004, p. 26). Relatedness support is fostered when students develop beneficial relationships with others. As a result, student intrinsic motivation increases (Legault et al., 2006). In addition, all three types of social support are negatively associated with all four subtypes of amotivation. That is, as classroom autonomy, competence, and relatedness support increase, amotivation decreases (Legault et al., 2006). Indeed, competence and relatedness support have recently been negatively associated with amotivation in the PE setting (Shen, Weidong, Sun, & Rukavina, 2010).

While relatedness may be appropriately "[defined] by school climate, quality of teacher-student relationships, feelings of belonging, caring, inclusion, acceptance, importance, and interpersonal support" (Shen, McCaughtry, Martin, Fahlman, & Garn, 2012, p. 231), relatedness studies may be most often conducted in consideration of teacher-to-student relationships (Furrer & Skinner, 2003). In terms of defining relatedness then, this study concentrates specifically on the exploration of the teacher-to-student relationship. Recently, Shen et al. (2012), in a cross-sectional study provided evidence that motivational profiles in high school girls are positively affected by increases in teacher-to-student relatedness.However, despite its proposed importance, teacher-to-student relatedness has yet to be studied in an experimental design as the primary manipulation. To do so presents several distinct challenges including (a) controlling for prior perceptions of student relationships with teachers, (b) manipulating relatedness while retaining appropriate instructional practices, and (c) achieving desired learner outcomes.

Given the paucity of relatedness studies and that relatedness research in PE has been primarily limited to female students (i.e., Shen et al., 2012), the relationship between motivation and relatedness support for males remains unclear. Similar research on male students is warranted and may provide additional insight. The purpose of this study was to assess the effects of levels of teacher-to-student

relatedness support on the motivation of male PE students in weight training classes. It was hypothesized that students in the high-relatedness group would reveal higher levels of situational motivation than those in the self-guided group.

Method

Context

The present study was conducted in three junior high schools in the Intermountain West. The first school serves 1,264 (675 male and 589 female) seventh to ninth grade students with a majority of students being Caucasian and Hispanic from middle to middle-upper-class socioeconomic backgrounds. The second school serves 1,086 (530 male and 556 female) seventh to ninth grade students with a majority of students being Caucasian and Hispanic from middle to middle-upper-class socioeconomic backgrounds. The third school serves 956 (475 male and 481 female) seventh to ninth grade students with a majority of students being Caucasian and Hispanic from middle-class socioeconomic backgrounds.

Participants/Measures

Among the three schools, a total of 180 (School 1 is composed of four classes with $n = 106$ students; School 2 is composed of two classes with $n = 47$ students; School 3 is composed of two classes with $n = 27$ students) seventh, eighth, and ninth grade boys were enrolled in an elective weight training class during the semester. In addition, six girls were enrolled in weight training but were excluded from data collection based on an overrepresentation of boys. Each student received and returned signed letters of consent/assent forms approximately two weeks before the study began. Students who did not return consent/assent documents were excused from participation. Thus the study sample composed of ($N = 166$) participants.

Contextual motivation. A modified (referencing PE instead of sport) version of the 18-item, six-subscale Sport Motivation Scale II (SMS II-PE) was used to measure intrinsic motivation (IM), extrinsic motivation (EM), and amotivation (AM; Pelletier et al., 2013) at the contextual level. The stem states, "Why do I participate in physical education/weight training?" Students responded to 18 statements on a 7-point Likert scale wherein *corresponds not at all* = 1

and *Corresponds exactly* = 7. For example, they responded (a) "because it gives me pleasure to learn more about the activity" or (b) "because I would not feel worthwhile if I did not." Used in this study to assess any preexisting dispositions toward PE, this scale assesses the motivational dispositions of students toward physical education in general.

Situational intrinsic motivation. A modified version of the 16-item, four-subscale Situational Motivation Scale (SIMS-PE) was used to measure motivation at the situational level (Guay & Vallerand, 2000; Standage, Treasure, Duda, & Prusak, 2003). The stem states, "Why are you currently participating in this body conditioning unit?" Students responded to 16 items on a 7-point Likert scale. For example, they responded that they were participating in the current activities (a) "because I think that this activity is interesting" or (b) "because I don't have a choice."

Amotivation. A modified (to include weight training) version of the 16-item, four-subscale Amotivation Inventory (AI-PE) was used to measure amotivation (Shen, Winger, Li, Sun, & Rukavina, 2010). The stem states, "I don't participate in weight training (WT) activities… Students responded to 16 items on a 7-point Likert scale. For example, they responded that they didn't participate in the current activities (a) "because, for me, WT holds no interest" or (b) "because I'm not good at WT."

Relatedness support. A modified (suitable for weight training) version of the 12-item, three-subscale Interpersonal Behavioral Scale (IBS) was used to measure perceptions of competence, autonomy and relatedness support (Shen et al., 2010). Students responded to 12 statements on a 7-point Likert scale wherein *Never* = 1 and *Always* = 7. For example, "I feel that my WT teacher sincerely cares about me" or (b) "My WT teacher does not care if I succeed or fail.

Data Analysis

Subscale means and standard deviations for each questionnaire (SMS II-PE, SIMS-PE, AI-PE, and IBS) were calculated. Specifically, raw scores from each of the 18 items of the SMS II-PE were reduced to six subscale means by averaging the raw scores from their three corresponding items. Similarly, the 16 items of the SIMS-PE were reduced to four subscales by averaging their four corresponding items. Likewise, the 16 items of the AI-PE were reduced to four subscales

by averaging their four corresponding items. Finally, the 12 items of the IBS were reduced to four subscales by averaging their three corresponding items. All subsequent analyses were conducted using these subscale means. Cohen's *d* is a measure of effect size. Generally, a Cohen's *d* between .15 and .40 represents a small effect, between .40 and .75 a medium effect, and above .75 a large effect (Cohen, 1992).

Procedures

All study procedures received university's Institutional Review Board and district approval as well as approval from the principals of the schools in which the study was conducted. Each participating teacher was male with an average of three years teaching experience. The principal researcher of the present study was one of the participating teachers. All three participating teachers assembled for script training in early August of 2013. The teacher script training was designed to help all participating teachers understand the theoretical framework and purpose of the intervention. The meeting included discussing specifics about the teacher's role in the two treatment groups, the dissemination and collection of data, and the curriculum timeline. Teachers were given printed copies of all scales, assignments, CDs, and DVDs necessary for the intervention. Following the script training, additional follow-up (via phone conversation, e-mail, and text messaging) continued through the entire data collection process. In early September, the principal researcher distributed consent/assent forms to each of the teachers who distributed the forms to each of the students. One week prior to the intervention, the teachers distributed the SMS II-PE survey to students in the class to measure students' preexisting contextual motivation toward PE. The intervention occurred during 2 weeks beginning in the second week of September 2013. Treatment groups were differentiated between distal ends of accepted teaching practices. For example, one group contained high teacher-centered instruction and the other high student-centered (see Mosston, 2002). Each teacher adhered to the predetermined schedule of lesson sequencing and teaching style and frequent (daily or every other day) in-person visits, phone conversations, and/or emails between the principal and coinvestigators were maintained throughout the intervention to maintain fidelity of treatment.

The high teacher-centered instruction (i.e., "command style") was chosen for the high-relatedness group to get the teachers heavily involved in the instruction process. It was intended that teachers interact with as many students as possible and as frequently as possible through each phase of the lesson plan, thus creating an environment where students were dependent upon the teacher for instruction, feedback, and support. Contrastingly, the self-directed group learned using a modified form of Mosston's "self-teaching" style that removed the teacher from the learning, causing the students to rely on their own efforts or that of classmates to direct their learning. For example, when a student in the high-relatedness group asked a question, the teacher clearly answered the question. In the self-directed group, students asking similar questions were directed to a poster to discover the answer for themselves. This was a modified version of "self-teaching" as the student was provided the content and direction for what to learn (by the teacher) and did not decide everything about learning something new. The self-teaching form of instruction was chosen to give students the opportunity to guide their own learning while having the least possible interaction with the teacher.

The same 2-week unit of instruction was taught to one of two treatment groups: (a) low-relatedness: self-guided individual instruction and (b) high-relatedness: instruction with high levels of teacher-to-student interaction. For example, during the aerobic kickboxing lesson, the students in the low-relatedness group followed an instructor on a popular instructional DVD. When the high-relatedness group was taught the same lesson, however, the teacher was the instructor. Each participating teacher had previously familiarized himself with the moves, pacing, and instruction of the aerobic kickboxing lesson until he felt comfortable teaching it to his students.

On Day 1 of the intervention, the weight training unit was introduced. A lesson on flexibility was taught, and the AI-PE and IBS surveys were administered. On Day 2, a lesson on kickboxing was taught, and the SIMS-PE survey was administered. On Days 3 through 10, students participated in and completed assignments for various body-conditioning lessons. On Day 9, the SIMS was again administered. On Day 10, the AI-PE and IBS were again administered. One week following the intervention, the SMS II-PE was again administered to all students. Each treatment group consisted of four intact weight training classes. Surveys were administered pre- and

postintervention to all students in both treatment groups. Surveys were recorded by a team of research assistants and rechecked visually for missing data or keystroke errors. The resulting data set, $N = 166$, was used for subsequent analysis. All surveys were proctored using the same set of instructions that were read prior to each survey. Each survey has demonstrated acceptable levels of validity and reliability (Briere, Vallerand, Blais, & Pelletier, 1995; Guay & Vallerand, 2000).

Results

Motivational Responses

Contextual motivation. Group means, standard deviations, and effect sizes for SMS II-PE are shown in Table 1**.** Unexpectedly, there were significant preexisting differences between groups in contextual motivation (via SMS II-PE), indicating that the self-directed group began the intervention (a) more intrinsically motivated on a contextual level, $F(1,159) = 4.690$, $p < .05$; (b) had a higher sense of integrated regulation on a contextual level, $F(1,162) = 7.264$, $p < .05$; (c) felt more externally regulated on a contextual level, $F(1,162) = 6.772$, $p < .05$. Thus preexisting conditions were statistically controlled in all subsequent analyses. Surprisingly, after preexisting conditions were controlled, and the intervention was implemented, the self-directed group means for the more positive motivational indices (IM, INR, IDR, IR) were higher than the high-relatedness group (Table 1). However, the self-directed group also scored higher in the ER and AM constructs. This indicates that after the intervention, the self-directed group (a) felt more intrinsically motivated, $F(1,158) = 7.017$, $p < .05$; (b) felt a higher sense of integrated regulation, $F(1,162) = 8.932$, $p < .05$; (c) felt a higher sense of identified regulation, $F(1,160) = 6.543$, $p < .05$); felt a higher sense of introjected regulation, $F(1,158) = 8.383$, $p < .05$; felt more externally regulated, $F(1,162) = 6.986$, $p < .05$; and felt more amotivated, $F(1,163) = 7.085$, $p < .05$.

Situational motivation response. Group means, standard deviations, and effect sizes for SIMS-PE are shown in Table 1. Preintervention, the two groups differed significantly with respect to IR, ER, and AM but not IM. However, there were no significant differences between groups or within trials postintervention.

Table 1

Means and Standard Deviations and Effect Sizes for Low- and High-Relatedness Groups on Eight Questionnaires and 16 Subscales

	Low Relatedness		High Relatedness		
Subscale	***M***	***SD***	***M***	***SD***	**ES**
SMS II-PE 1 IM	4.98**	1.5	4.47	1.5	0.34 †
INR	4.12**	1.4	3.52	1.5	-0.240 †
IDR	4.89	1.3	4.56	1.6	0.225 †
IR	3.25	1.4	3.09	1.4	0.114 †
ER	2.20**	1.5	1.69	.89	0.411 ††
AM	2.13	1.4	1.84	.96	0.240 †
SMS II-PE 2 IM	5.36**	1.5	4.70	1.7	0.411 ††
INR	4.46**	1.6	3.68	1.7	0.472 ††
IDR	5.30**	1.5	4.65	1.7	0.404 ††
IR	4.00**	1.5	3.30	1.5	0.466 ††
ER	2.55**	1.8	1.94	1.2	0.399 †
AM	2.40**	1.7	1.82	1.0	0.417 ††
SIMS-PE 1 IM	5.49	1.3	5.18	1.3	0.238 †
IR	5.70**	1.2	5.23	1.4	0.361 †
ER	2.72**	1.6	2.03	1.1	0.501 ††
AM	2.08**	1.5	1.71	.83	0.30
SIMS-PE 2 IM	5.10	1.5	5.10	1.4	0.00
IR	5.43	1.4	5.26	1.4	0.121
ER	2.52	1.6	2.10	1.3	0.289
AM	2.00	1.2	1.77	1.1	0.200
AI-PE 1 Abl	1.60	.88	1.68	.86	-0.09
Eff	1.61	.88	1.83	.91	-0.245
Val	1.47	.88	1.55	.80	-0.095
Tsk	1.61	.91	1.67	.92	-0.065
AI-PE 2Abl	1.56	.98	1.74	1.0	-0.181
Eff	1.72	1.0	1.83	.94	-0.113
Val	1.48	.79	1.50	.68	-0.027
Tsk	1.76	1.2	1.79	1.0	-0.03
IBS 1 AS	5.11	1.3	5.29	1.0	-0.155
CS	5.47	1.2	5.77	1.0	-0.272
RS	5.44	1.3	5.56	1.0	-0.103
IBS 2 AS	5.24	1.4	5.29	1.3	-0.037
CS	5.54	1.0	5.73	1.2	-0.171
AS	5.3	1.3	5.70	1.2	-0.319

Note. †† Medium Effect Size. †Small Effect Size. ES = $(M_1 - M_2)/SD_{pooled.}$ IM = intrinsic motivation; INR = integrated regulation; IDR = identified regulation; IR = introjected regulation; ER = external regulation; AM = amotivation; Abl = ability beliefs; Eff = effort beliefs; Val = values of a task; Tsk = characteristics of a task; AS = autonomy support; CS = competence support; RS = relatedness support.

**Significant correlations $p < .05$.

Amotivation response. Group means, standard deviations, and effect sizes for AI-PE are shown in Table 1. No significant differences were found between groups or within trials.

Needs support response. Group means, standard deviations and effect sizes for IBS are shown in Table 1. No significant differences were found between groups or within trials.

Reliability and Internal Consistency

Internal consistency of the SMS II-PE, SIMS-PE, AI-PE and IBS scales was assessed using Cronbach's a (Cronbach, 1951). All subscales from all four instruments ranged from .65 to .94. Acceptable reliability scores are generally considered to be ≥ .7 (Cronbach, 1951; see alphas on diagonals of Tables 2–5).

The subscale correlations generally support the simplex pattern of the SMS II-PE. It is asserted that intrinsic motivation (IM) integrated regulation (INR), identified regulation (IDR), introjected regulation (IR), External Regulation (ER), and amotivation (AM) lie on a continuum. While this relationship pattern is consistent throughout the SMS II-PE (see Table 2, above and below diagonal), the distal relationships never reveal a negative correlation as with the original version of the SMS-PE used in Prusak et al. (2004). The absence of a pronounced simplex pattern, the marginally acceptable alphas (IRa1, a2 and AMa1) and the unexpected preexisting between-group differences in SMS II-PE 1, may lead the readers to question the suitability of the SMS II-PE for this setting and should interpret data with caution.

Table 3 contains the correlations between subscales of both SIMS-PE 1 (below diagonal) and SIMS-PE 2 (above diagonal) depicting the increasingly negative relationship for both trials. However, the simplex pattern is very much more pronounced in the SIMS-PE 2. Correlations in top row in Table 1 indicate that while IM is moderately positively related to IR, it is increasingly negatively related with ER and AM. Note also that the Cronbach alphas indicate that high internal consistency among subscale items across both trials. Thus, we can conclude that the SIMS-PE held up very well for use with this population.

Table 2
SMS II-PE Correlations and Cronbach's Alphas

Subscales	IM	INR	IDR	IR	ER	AM
IM	.80, .85	.65**	.66**	.51**	.23**	.15
INR	.65**	.76, .85	.74**	.62**	.42**	.37**
IDR	.53**	.64**	.74, .86	.64**	.26**	.19*
IR	.39**	.59**	.47**	.65, .69	.59**	.47**
ER	.23**	.53**	.20*	.65**	.75, .79	.81**
AM	.18*	.42**	.14	.49**	.75**	.69, .76

Note. Correlations for SMS 1 are located below diagonal and for SMS 2 are located above diagonal. Cronbach alphas are located along the diagonal (α_1, α_2).

**Correlation is significant at the 0.01 level. *Correlation is significant at the 0.05 level.

Table 3
SIMS-PE Correlations and Cronbach Alphas

Subscales	IM	IR	ER	AM
IM	.82, .86	.66**	-.16	-.26**
IR	.73**	.80, .80	-.17	-.21*
ER	-.11	-.06	.81, .85	.70**
AM	.00	-.01	.64**	.80, .78

Note. Correlations for SIMS-PE 1 are located below diagonal and for SIMS-PE 2 are located above diagonal. Cronbach alphas are located along the diagonal (α_1, α_2).

**Correlation is significant at the 0.01 level. *Correlation is significant at the 0.05 level.

Table 4 contains the correlations and alphas for the AI-PE. As expected, the four types of amotivation are moderately correlated with one another. There is no proposed ordering for these subscales. Rather, each subscale provides insight into the nature of student amotivation. The subscale alphas indicate an acceptable level of internal consistency across trials. It appears that this scale is suitable for use with this population.

Table 4
AI-PE Correlations and Cronbach's Alphas

Subscales	Ability	Effort	Value	Task
Ability	.77, .85	.76**	.60**	.62**
Effort	.74**	.78, .80	.59**	.67**
Value	.68**	.66**	.80, .70	.68**
Task	.64**	.71**	.67**	.86, .87

Note. Correlations for AI-PE 1 are located below diagonal and for AI-PE 2 are located above diagonal. Cronbach alphas are located along the diagonal (α_1, α_2).

**Correlation is significant at the 0.01 level. *Correlation is significant at the 0.05 level.

Table 5 contains the subscale correlations and alphas for the IBS for both trials. As expected, perceptions of support for autonomy, competence and relatedness are moderately and positively correlated with one another. As with the AI-PE, there is no proposed order among these subscales. Notable is the marginally acceptable internal consistency in competence support in both trials ($CS_{\alpha 1}$ and $CS_{\alpha 2}$). Despite this, the IBS appears to be an appropriate instrument for use in this setting.

Table 5
IBS1 and IBS 2 Correlations and Cronbach's Alphas

Subscales	AS	CS	RS
AS	.78, .84	.79**	.82**
CS	.73**	.65, .68	.74**
RS	.73**	.69**	.70, .77

Note. Correlations for IBS 1 are located below diagonal and for IBS 2 are located above diagonal. Cronbach alphas are located along the diagonal (α_1, α_2).

**Correlation is significant at the 0.01 level. *Correlation is significant at the 0.05 level.

Discussion

The purpose of this study was to examine the effects of different teacher-to-student relatedness on the motivation of adolescent males in a junior high school weight training class. Using a quasi-experimental design, the researcher sought to create a sufficiently strong manipulation of teacher-to-student relatedness without sacrificing the quality of the learners' educational experience and learning outcomes. Thus, students were subjected to two conditions, high-relatedness, in which teachers maintained high levels of personal interaction with their students, and low-relatedness, in which students engaged in individualized or self-directed learning. Student preexisting contextual motivational perceptions of PE were assessed in order to identify and control for, if found.

Contextual Motivation Findings

The reason for using the SMSII-PE is that the researcher had to have a measure to test whether there were any preexisting conditions between the treatment groups. This was done because it was not possible to randomly assign students to one of two groups. Though intact classes were randomly assigned to either group, it could not be assured that they were drawn from the same population. Therefore the researcher used the SDT contextual motivation instrument (SMS II-PE) to assess any possible preexisting differences. Although none were expected, some were found. This is most likely due to the nature of the instrument rather than any actual preexisting differences. Nonetheless, those items were covaried for which differences were noted. Caution is recommended in placing too much importance on this contextual measure as the short nature of the intervention (10 days) is generally not likely to reveal any pre- or postcontextual motivational differences. Perhaps this instrument ought to undergo further psychometric testing and possibly refinement for use in this population.

Difficulty of Relatedness Interventions

A significant challenge to this study was the difficult nature of *interventional* relatedness studies in general. Compared to studies examining competence and autonomy support in PE, only a few relatedness studies exist in PE (see Shen et al., 2010; Shen et al., 2012) and

those being conducted use a cross-sectional design. Few, if any, PE intervention studies have been conducted in which relatedness was the primary manipulation. This is likely because establishing a control group presents a challenge to the researcher. Within the context of self-determination, relatedness denotes a positive experience between significant others (Shen et al., 2012). Therefore, the opposite of relatedness, by definition, would be to expose students to a negative school climate including negative teacher-to-student relationships. Moreover, of necessity, the environment would discourage feelings of belonging, caring, inclusion and acceptance while simultaneously decreasing student's feelings of importance and interpersonal support. Such ethical issues appear to be insurmountable barriers for a researcher to establish an authentic relatedness control group. For example, it would be both unwise and unsafe to place students in a learning environment where proper training and instruction were omitted, regardless of the duration of the intervention. Likewise purposefully consigning students to a negative instructional environment may exhibit both short-and long-term negative psychological effects.

Possible Autonomy Countereffect

Though not significant, the self-directed group seemed to be trending in increased situational motivation (see means Table 1 SIMS-PE IM, IR). This may be explained by the Hawthorn effect, where otherwise "ignored" students are benefitting from a battery of psychometric tests while having researchers watching and asking them questions. However, it is also possible that in an effort to create a low-relatedness group and remain ethically bound, the researcher designed an intervention which inadvertently elicited a response to the increase in autonomy, creating a countereffect that led students in the self-directed group to feel a greater sense of autonomy than the high-relatedness group. Perhaps the more "hands-off" teaching style was a welcome change for the students. Previous studies have indicated the import of students' perceived autonomy in developing enhanced intrinsic motivation in the classroom (e.g., Prusak et al., 2004). Additionally, competence and autonomy are considered to be of greater consequence than relatedness with respect to intrinsic motivation (Deci & Ryan, 2000).

Social Needs Support

It may also be revealing to note that although differences were not significant, the high-relatedness group appeared to begin to sense more needs support from their teachers (see Table 1 means, SD, and effect sizes for both groups on IBS 1). This may indicate that within the short duration of the intervention (10 school days) students began to take note of the teacher paying more or less personal attention to them. Nevertheless, the possible perceived change (increase for self-directed and decrease for high-relatedness) in the student's autonomy appeared to have more effect upon the students internally-originated motivation than did teacher-to-student interaction (see Deci & Ryan, 2000).

Several indicators also suggest that the teachers had already established healthy relationships with their students before the intervention. The weight training classes in this study are elective classes, and it is quite possible that preexisting positive feelings toward the teacher led students to enroll. Furthermore, the preintervention mean score of all participants on the IBS scale (measuring perceived competence, autonomy, and relatedness support) was relatively high (5.5 on a 7-point Likert Scale,) suggesting students had already formed positively stable opinions of their teachers.

Since contextual motivation is considered more stable than situational motivation (Vallerand, 2007), previous opinions of students toward their teacher and weight lifting in general would likely change only with repeated and consistently negative situational experiences. Consequently, students may be able to endure 10 days of little to no interaction with their teacher and still maintain positive feelings toward the teacher. While other studies have shown relatively immediate responses to manipulations in situational autonomy (e.g., Prusak et al., 2004; Ward, Wilkinson, Graser, & Prusak, 2008) and competence (e.g., Tao, Solomon, & Xiangli, 2012), this study seems to indicate that perceptions of relatedness may not be as responsive to efforts of manipulation. Similar relatedness studies with longer intervention periods (e.g., semester or full year) may increase our knowledge of the impact of relatedness on both situational and contextual motivation.

Limitations and Conclusion

There are important limitations to this study. First, the participants were all boys. It does not address the female population in single-sex classes or both sexes in coed classes. Furthermore, classes were all elective rather than required. Second, the short duration of the intervention (2 weeks) may not have been long enough to adequately alter relational effects between teachers and students.

Even though the teachers were much more engaging and interactive in the high-relatedness group, ultimately the instruction was still teacher-centered, leaving the students to possibly begin to feel slightly more relatedness with the teacher but perhaps at the expense of their autonomy. When taken in context with the extant literature, the results of this study may indicate that teachers should not only strive to build healthy rapport with their students but must do so without undermining their sense of autonomy (see Mosston, 2002). It may be important for teachers to ensure that teacher-centered instruction (however supportive or entertaining) is delivered sparingly and intermittently within a cushion of student-centered learning activities which allow for more individualized feedback and interaction between students and their teacher. It seems therefore essential that teachers take care in meeting all the social needs of students rather than isolating one or two of those needs apart from the others. Relatedness support alone may be difficult to measure because as Shen et al. (2010) state, "a relatedness-supportive teacher is the one who demonstrates democratic interaction styles [which implies autonomy support], develops expectations for student behaviors in light of individual differences, models a 'caring' attitude toward their own work, and provides constructive feedback" (Shen et al., 2010, p. 428).

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PEDAGOGY

Measuring Perceptions of Teachers' Caring Behaviors and Their Relationship to Motivational Responses in Physical Education Among Middle School Students

Qi Zhao and Weidong Li

Abstract

There lacks a valid and reliable measurement on perceptions of teachers' caring behaviors and little is known about the link between perceptions of teachers' caring behaviors and students' motivational responses in physical education (PE). The goals of this study were to develop and validate a context-specific measurement of perceptions of teachers' caring behaviors and examine how middle school students' perceptions of teachers' caring behaviors would relate to their attitudes, effort and enjoyment in PE. One hundred seventy-eight sixth to eighth grade students completed self-reported surveys. An exploratory factor analysis provided evidence supporting the construct of perceptions of teachers' caring behaviors as unitary with multi-dimensions. MANOVAs and multiple regressions demonstrated that participants who reported high levels of perceptions of teachers' caring behaviors were more likely to display higher degree of positive attitudes toward PE and experience higher levels of enjoyments and more effort in PE. It is suggested that teachers create a caring climate to foster positive attitudes and increase intrinsic motivation among students in PE.

Qi Zhao is associate professor, Department of Wushu, Nanjing Sport Institute. Weidong Li is associate professor, Department of Human Sciences, The Ohio State University. Please send author correspondence to li.832@osu.edu

Noddings (1992) has argued, "Caring is the very bedrock of all successful education" (p. 27). The interpersonal interactions between teachers and students have been placed at the core of the teaching-learning processes (e.g., Bruner, 1996; Noddings, 1992, 2002). For a teacher to be effective, he or she must emphasize both content and caring in his or her teaching (Lumpkin, 2007; McEwan, 2002). Research on teachers' caring behaviors in classroom settings has shown that students who perceive that their teachers care for their learning demonstrate more positive attitude toward school (e.g., Battistich, Solomon, Watson, & Schaps, 1997), and greater motivation to learn (Wentzel, 1997; Wentzel & Asher, 1995). Given the critical role of the ethic of care in student learning, Owens and Ennis (2005) have called on university physical education teacher education programs to include the development of caring teaching behaviors as pedagogical content knowledge in their curriculum to train preservice teachers on how to foster a caring relationship with students. How to build a caring relationship with students has begun to become an important line of research in physical education (PE) at a time when students often lack interest in learning and are disengaged in PE (e.g., Carlson, 1995).

According to Noddings (1984, 1992, 2013), the ethic of caring can be enacted through a connection built between the "one-caring" and the "cared-for." This interactive, relational process is composed of three components: Engrossment, actions and reciprocity. Engrossment is defined as a desire for the "one-caring" to show concerns about the well-beings of the "cared for." Actions refer to any behaviors that are directed by the "one-caring" toward the welfare, protection, or enhancement of the one being cared for. Reciprocity refers to a recognition of and response to the caring behaviors of the "one-caring" by the "cared for." For the ethic of caring to exist, both the "one-caring" and the "cared-for" must contribute to this interactive, relational process (Noddings, 1984, 2013). For example, the ethic of caring is enacted when a teacher walks over to check whether he or she is okay after a student falls onto the ground during a game. The student responds by saying, "Thanks, I am fine." Then she or he gets up and continues to be engaged in the game.

Some studies have been conducted to directly or indirectly examine the ethic of caring in the field of PE (Cothran & Ennis, 1999, 2000; Cothran, Kulinna, & Garrahy, 2003; Ennis et al., 1997; Gano-

Overway, 2013; Larson, 2006; Lee & Ravizza, 2008; Li, Rukavina, & Foster, 2013; Wilson et al., 2012). Consistent with the findings from general education, these studies in school PE have suggested that there is a strong, positive link between teachers' caring behaviors and students' attitudes toward PE, self-regulated motivation, prosocial behaviors and cognitive empathy, and levels of engagement in PE (e.g., Cothran & Ennis, 1999, 2000; Cothran, Kulinna, & Garrahy, 2003; Ennis et al., 1997; Gano-Overway, 2013; Larson, 2006; Wilson et al., 2012). Students participate more, are more self-determined, and display positive attitudes and prosocial behaviors in PE when they perceive that teachers care for their well-being, show willingness to work with them, and create a safe and motivating learning climate with an emphasis on personal growth and cooperation. However, the majority of the previous studies were qualitative in nature (Cothran & Ennis, 1999, 2000; Cothran, Kulinna, & Garrahy, 2003; Ennis et al., 1997; Larson, 2006; Lee & Ravizza, 2008; Li et al., 2013). Only two quantitative studies have examined the relationship between students' perceptions of teachers' caring behaviors and their prosocial behaviors, motivation, and engagement in PE (Gano-Overway, 2013; Wilson et al., 2012). The main reason that limited quantitative studies have been conducted is due to lack of valid and reliable measurements of perceptions of teachers' caring behaviors in PE. For example, in the Wilson et al. study (2012), caring was assessed via one of the four subscales of transformational teaching. Gano-Overway (2013) modified a caring climate scale in a physical activity setting to assess students' perceptions of teachers' caring behaviors in a PE setting.

A valid and reliable measurement of perceptions of teachers' caring behaviors in PE is needed to advance this line of research. Recently, Newton et al. (2007) have developed a self-reported survey to assess perceptions of teachers' caring behaviors in physical activity settings: The Caring Climate Scale (CCS). The CCS is a 13-item survey with a 5-point Likert scale. This survey assesses to what degree an individual perceives a particular learning climate as safe, respectful, inviting, supportive, and valuable. This survey has been modified to assess students' perceptions of teachers' caring behaviors in PE (Gano-Overway, 2013). Gano-Overway (2013) reported a Cronbach's alpha of .94; however, the author did not further validate the psychometrics of the CCS through a confirmatory factor analy-

sis. Even though the preliminary study showed that the CCS measurement produced valid and reliable scores (Newton et al., 2007), it has been conceptualized as a single dimension, fails to fully capture all the aspects of teacher-student interactions where a caring relationship can be created between the "caring for" and the "cared-for" in PE, and is not context-specific.

As suggested by Li et al. (2013), teachers' caring behaviors can be manifested through providing differentiated instruction and feedback focusing on individual task mastery and improvement, building interpersonal rapport, and fostering positive motivational learning climates. Larson (2006) also reported 11 clusters of caring teaching behaviors: (a) showed me how to do a skill, (b) honored my request to choose an activity, (c) gave me a compliment, (d) confronted my behavior, (e) inquired about my health, (f) attended to me when I was injured, (g) allowed me to redo my test, (h) motivated me, (i) played/participated with me during class, (j) persuaded me, and (k) showed concern for my future health. The data from these two qualitative studies suggest that perceptions of teachers' caring behaviors should be multidimensional and context-specific. Motivational constructs must be context-specific since students' efficacy or ability beliefs, goals, and values that they bring to an achievement context can be overridden by the types of learning environments that teachers create. Therefore, a valid and reliable caring measurement will need to assess the teacher-student interactions in all the three domains and be PE-context specific.

As an important motivational construct, enjoyment reflects a person's state of feeling happy and fun (Scanlan & Simons, 1992). Students who enjoy PE are likely to develop positive attitude toward PE (Centers for Disease Control and Prevention [CDC], 1997), be motivated to participate in PE (e.g., CDC, 1997; Hashim, Grove, & Whipp, 2008; Wallhead & Buckworth, 2004), and be engaged in out-of-school physical activities (e.g., Sallis, Prochaska, Taylor, Hill, & Geraci, 1999; Yli-Piipari, Watt, Jaakkola, Liukkonen, & Nurmi, 2009). Given that students' enjoyment in PE significantly impacts their learning in PE and engagement in out-of-school exercise, researchers have called for more research to identify effective strategies to increase their enjoyment in PE (e.g., Prochaska, Sallis, Slymen, and McKenzie, 2003; Sallis, Prochaska, & Taylor, 2000).

Students' attitude toward PE and perceived effort have also been identified as important motivational constructs, which can affect students' learning and performance in PE (Solmon, 2003). Research has shown that students' attitudes toward PE can affect their exercise intention and behaviors outside school (e.g., Ferguson, Yesalis, Pomrehn, & Kirkpatrick, 1989). When teachers create a positive, motivating learning climate where personal improvement and task mastery are emphasized, it can enhance positive attitude, enjoyment and effort among students in PE (e.g., Chen & Darst, 2001; Xiang, McBride, Bruene, & Liu, 2007). However, the link between a caring learning climate and students' attitudes, enjoyment and effort in PE is unknown.

To address these limitations of measurement on perceptions of teachers' caring behaviors and the gap in the link between perceptions of teachers' caring behaviors and students' motivational responses in PE, the purposes of the present study were to develop and validate a context-specific measurement of perceptions of teachers' caring behaviors in PE and examine how middle school students' perceptions of teachers' caring behaviors relate to their attitudes, effort, and enjoyment in PE. We hypothesized that perceptions of teachers' caring behaviors, as a unitary construct, would be valid and reliable to measure students' perceptions of teachers' caring behaviors in PE and perceptions of teachers' caring behaviors would be strongly associated with positive attitudes toward PE, higher levels of enjoyment and effort in PE.

Method

Participants

Participants were sixth to eighth grade students (n = 178: 56 boys and 122 girls; 118 European Americans, 12 African Americans, seven Asian Americans, four Hispanic Americans, and 37 others) who were enrolled in PE from two selected suburban schools in a Midwest region in the United States. They volunteered to participate in the study. The mean age was 12.4 (SD = .89), with a range from 11 to 14 years old. These schools have been used as field experience sites for the second author's undergraduate physical education teacher education students. All the PE teachers at the selected schools had 8–12 years of teaching experience and were committed to teach-

ing. One of the researchers has closely worked with these teachers to supervise students during the field experiences. This study was approved by university IRB and school districts. The participants' assent and parental consent forms were also obtained.

Measures

Demographic information. Students' demographic information with regard to gender, ethnicity, age, and grade was collected using a personal data sheet.

Perceptions of teachers' caring behaviors in PE. Based on a review of the literature on teachers' caring behaviors in PE and physical activity (e.g., Larson, 2006; Lee & Ravizza, 2008; Li et al., 2013; Newton et al., 2007), we developed an initial list of 102 items reflecting teachers' caring behaviors in three domains: Instructional adaptations, interpersonal rapport, and motivational learning climate. After a thorough examination of these items, we combined similar items and eliminated repetitive ones, which resulted in a total number of 42 items (8 items for instructional adaptations, 15 items from interpersonal rapport, and 19 items from positive motivational climates). The survey employed a 7-point Likert-type scale ranging from 1 (*very strongly disagree*) to 7 (*very strongly agree*). An example item related to instructional adaptations was "My teacher reminds me of important parts to a skill continuously throughout the lesson." An example item related to interpersonal rapport was "My teacher says 'hi' to me while passing me in the hallways." An example item related to a positive motivational climate was "My teacher makes learning and activities fun." This 42-item questionnaire was sent to three experts in the field of caring to check content validity. The experts commented that our approach was interesting, the survey involved a variety of concepts, such as goal setting and task-involved, and there were similarities among items from different domains. Based on the feedback from the experts, we edited the items for language and clarity. The comment on similarities among items from different domains suggests that the construct of perceptions of teachers' caring behaviors may be unitary. The internal Cronbach's alpha for all 42 items was .98, showing a high level of internal consistency.

Attitude toward PE. Participants' attitudes toward PE were assessed by using a 20-item attitude instrument (Subramaniam & Silverman, 2000, 2007). This instrument consisted of two subscales:

Enjoyment and perceived usefulness. It employed a 5-point Likert-type scale with a range from 1 (*strongly disagree*) to 5 (*strongly agree*). An example item for the attitude-enjoyment subscale was "My PE teacher gets me excited about PE." An example item for the attitude-usefulness subscale was "My PE teacher makes my PE class seem important to me." The previous studies have demonstrated that this instrument is valid and reliable to measure middle school students' attitudes toward PE (Subramaniam & Silverman, 2000, 2007). The internal Cronbach's alphas for the study were .94 and .95 for attitude-enjoyment and attitude-usefulness subscales, showing a high level of internal consistency.

Perceived enjoyment. A four-item subscale from Intrinsic Motivation Index (McAuley, Duncan, & Tammen, 1989) was used to measure participants' perceived enjoyment in PE. It used a 6-point Likert-type scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). An example item was "I enjoyed PE very much." The standardized Cronbach's coefficient alpha for our study was .93, which showed a high level of internal consistency.

Perceived effort. A four-item subscale from Intrinsic Motivation Index (McAuley et al., 1989) was used to measure participants' perceived effort in PE. It employed a 6-point Likert scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). An example item was "I tried very hard in PE." The standardized Cronbach's coefficient alpha for our study was .87, demonstrating a high level of internal consistency.

Procedure

Participants were pulled from their regular PE class time to take the surveys. They sat around the tables at cafeteria or on the gym floor to complete the surveys. Instructions were provided on how to fill out the surveys. The participants were told that there were no right or wrong answers and were encouraged to ask questions if they did not understand any item on the surveys. Participants were also informed that their answers were anonymous and would not affect their grade in PE. It took participants about 30 min to complete the surveys.

Data Analysis

The negatively worded items for all the scales were reverse coded prior to data analysis. The aggregate scores were calculated by sum-

ming all responses for each subscale and dividing by the relevant number of items per subscale, including perceptions of teachers' caring behaviors, perceived effort, perceived enjoyment, attitude-usefulness, and attitude-enjoyment. An exploratory factor analysis was conducted to validate the measurement of perceptions of teachers' caring behaviors. Cronbach's coefficient alpha analyses were conducted to examine the internal consistency for all the scales. A MANOVA with attitude-enjoyment and attitude-usefulness as dependent variables was conducted to examine the relationship between perceptions of teachers' caring behaviors and attitudes toward PE by accounting for gender, ethnicity, and grade effects. Follow-up ANOVAs were also conducted to examine the relationship between each of the two attitude subscales and perceptions of teachers' caring behaviors by accounting for gender, ethnicity, and grade effects. Two multiple regressions with perceived enjoyment or perceived effort as a dependent variable were conducted to examine the relationship between perceived enjoyment/perceived effort and perceptions of teachers' caring behaviors in PE by accounting for gender, ethnicity, and grade effects.

Results

The means and standard deviations for all variables by gender, ethnicity, and grade are presented in Tables 1 and 2. An inspection of the means showed that participants in the present study assigned moderately high scores to all the motivational variables. The scree plot and the rotated factor patterns from our initial exploratory factor analysis showed evidence supporting a single factor structure. The exploratory factor analysis with a single factor showed that the factor loadings for all items were high ranging from .49 to .90, as reflected in Table 3. The percentage of explained common variance by the model was 59%, which showed evidence supporting a single unitary construct with multi-dimensions.

Table 1
Means and Standard Deviations of All Variables by Gender and Ethnicity

			Gender				Ethnicity									
	Overall		Male		Female		European American		African American		Asian American		Hispanic American		Others	
Variables	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Attitude-Enjoyment	3.64	1.04	3.81	.93	3.56	1.09	3.61	1.13	4.19	.69	3.84	.83	3.36	.53	3.55	.89
Attitude-Usefulness	3.70	.99	3.84	.93	3.63	1.02	3.67	1.06	4.36	.57	3.90	.83	3.68	.62	3.54	.90
Perceived Enjoyment	4.26	1.53	4.57	1.41	4.11	1.57	4.17	1.59	5.42	.63	4.54	1.44	3.88	1.13	4.13	1.50
Perceived Effort	4.84	1.09	4.97	1.05	4.79	1.10	4.86	1.09	5.60	.63	4.32	1.12	5.19	1.18	4.59	1.09
Perceptions of Teachers' Caring Behaviors	5.23	1.24	5.35	1.17	5.18	1.27	5.20	1.23	5.87	.71	5.27	1.11	4.88	.16	5.18	1.48

Table 2
Means and Standard Deviations of All Variables by Grade

	Grade					
	6th		7th		8th	
Variable	***M***	***SD***	***M***	***SD***	***M***	***SD***
Attitude-Enjoyment	4.10	.75	3.27	1.11	3.44	1.09
Attitude-Usefulness	4.13	.76	3.35	1.03	3.56	1.04
Perceived Enjoyment	4.99	1.12	3.80	1.62	3.83	1.54
Perceived Effort	5.24	.89	4.63	1.17	4.56	1.07
Caring	5.68	.94	4.76	1.34	5.33	1.22

The MANOVA analysis showed that there were overall significant effects of perceptions of teachers' caring behaviors, $F(2, 140) = 76.43$, $p = .0001$, and grade, $F(4, 280) = 3.08$, $p = .02$. No significant effects were found in ethnicity and gender. The follow-up ANOVA with attitude-enjoyment as a dependent variable showed that perceptions of teachers' caring behaviors, $F(1, 144) = 142.37$, $p < .0001$, and grade levels, $F(2, 144) = 6.47$, $p < .002$, significantly predicted participants' attitude-enjoyment in PE. Both gender, $F(1, 144) = 2.50$, $p = .12$, and ethnicity, $F(4, 144) = .34$, $p = .85$, failed to significantly predict participants' attitude-enjoyment in PE. This model accounted for 58% of the total variance. There was no evidence of violations of normal assumption, Shapiro–Wilks = .995, $p = .89$. The post hoc comparisons with a Bonferroni adjustment ($\alpha = .017$) showed that there was a significant difference in attitude-enjoyment between sixth and eighth grade participants ($p < .001$).

The follow-up ANOVA with attitude-usefulness as a dependent variable demonstrated that perceptions of teachers' caring behaviors, $F(1, 152) = 150.07$, $p < .0001$, and grade levels, $F(2, 152) = 4.76$, $p < .01$, significantly predicted participants' attitude-usefulness in PE. Both gender, $F(1, 152) = 1.51$, $p = .22$, and ethnicity, $F(4, 152) = 1.07$, $p = .37$, failed to significantly predict participants' perceptions of attitude-usefulness in PE. This model accounted for 58% of the total variance. There was no evidence of violations of normal assumption, Shapiro–Wilks = .99, $p = .30$. The post hoc comparisons with a Bonferroni adjustment ($\alpha = .017$) showed that there was a significant difference in perceived attitude-usefulness between sixth and eighth grade participants ($p < .0096$).

Table 3
Factor Loadings for All 42 Items

Items	Factor loading
My teacher checks on me if I am injured or not feeling well.	.73
My teacher makes us feel safe in class.	.79
My teacher makes us feel comfortable in class.	.77
My teacher gives me choices in my learning.	.61
My teacher does not "put me on the spot" in front of my peers.	.49
My teacher treats me with respect and fairly.	.80
If I don't understand how to do a task, my teacher clarifies it for me.	.77
My teacher says "hi" to me while passing me in the hallways.	.60
My teacher reminds me of important parts to a skill continuously throughout the lesson.	.69
My teacher makes learning and activities fun.	.83
My teacher creates an environment that makes me feel good about myself.	.83
My teacher is concerned with my well-being.	.73
My teacher pays attention to me.	.66
My teacher breaks skills down into small parts so I can learn them.	.81
My teacher greets me when I enter the gym.	.69
If a task is too hard for me, my teacher provides alternative tasks or segments of a task for me to do.	.63
My teacher listens to me.	.83
My teacher shows me how to correct my performance errors.	.76
My teacher is patient and understanding to me.	.85
My teacher makes personal connections with me.	.72
My teacher pushes me to work harder in class.	.74
My teacher has high expectations for me in class.	.65
My teacher makes me feel like I am important	.88
My teacher provides feedback on how I can perform the learning tasks better.	.82
If I stumble or feel bad, my teacher comes to see if I am okay.	.78
My teacher is available for me if I need help.	.84
My teacher provides opportunities for me to succeed in class	.77
My teacher motivates us to participate in class.	.76
My teacher encourages me to set goals for myself.	.85
My teacher makes us feel that we are respected in class.	.87
My teacher encourages me to do my best.	.87
My teacher makes us feel welcomed every day.	.88

Table 3 (cont.)

Items	Factor loading	Items	Factor loading
My teacher asks all of the students to try their best in class.	.80	My teacher gives me information or cues on how I can improve my skills in class.	.79
My teacher makes me feel like I am special.	.81	My teacher emphasizes that having effort is important to be successful in class.	.74
My teacher supports me to do my best.	.90	My teacher makes teamwork an important part of my class.	.67
My teacher makes tasks that challenge me.	.73	My teacher focuses me on challenging myself to improve or work on my skills.	.77
My teacher asks about things going on in my life.	.64		
My teacher is nice to me in class.	.84		

The regression of perceived enjoyment on perceptions of teachers' caring behaviors, gender, ethnicity, and grade showed that perceptions of teachers' caring behaviors, $F(1, 154) = 134.48$, $p < .0001$, and grade levels, $F(2, 154) = 8.71$, $p < .0003$, significantly predicted participants' enjoyment in PE. Both gender, $F(1, 154) = 1.93$, $p = .17$, and ethnicity, $F(4, 154) = .83$, $p = .51$, failed to significantly predict participants' enjoyment in PE. This model accounted for 56% of the total variance. There was no evidence of violations of normal assumption, Shapiro–Wilk = .98, $p = .05$. The post hoc comparisons with a Bonferroni adjustment ($\alpha = .017$) showed that there was a significant difference in perceived enjoyment between sixth and eighth grade participants ($p < .0001$).

The regression of perceived effort on perceptions of teachers' caring behaviors, gender, ethnicity, and grade showed that perceptions of teachers' caring behaviors, $F(1, 154) = 42.78$, $p < .0001$, and grade levels, $F(2, 154) = 5.58$, $p < .005$, significantly predicted participants' perceived effort in PE. Both gender, $F(1, 154) = .38$, $p = .54$, and ethnicity, $F(4, 154) = 2.43$, $p = .05$, failed to significantly predict participants' perceived effort in PE. This model accounted for 33% of the total variance. There was no evidence of violations of normal assumption, Shapiro–Wilks = .99, $p = .25$. The post hoc comparisons with a Bonferroni adjustment ($\alpha = .017$) showed that there was a significant difference in perceived effort between sixth and eighth grade participants ($p < .003$).

Discussion

The purposes of this study were to develop and validate a survey to measure middle school students' perceptions of teachers' caring behaviors in PE and examine the relationship among their perceptions of teachers' caring behaviors, attitudes toward PE, perceived enjoyment, and perceived effort in PE. Traditionally, perceptions of teachers' caring behaviors have been conceptualized as a single dimensional construct (e.g., Newton et al., 2007). In a recent study by Li et al. (2013), the conceptualization of perceptions of teachers' caring behaviors as a single dimensional construct has been challenged. Li et al. have proposed to reconceptualize perceptions of teachers' caring behaviors as a multidimension construct involving differentiated instruction and feedback, interpersonal rapport, and a positive motivated learning climate.

There is evidence in self-determination theory, where intrinsic motivation and amotivation have been conceptualized as unitary constructs due to high degree of correlation among their respective dimensions (Green-Demers, Legault, Pelletier, & Pelletier, 2008; Johnson, Prusak, Pennington, & Wilkinson, 2011; Standage, Duda, & Ntoumanis, 2003). The results of exploratory factor analysis provided evidence supporting a single-factor model and the internal consistent Cronbach's alpha of .98 showed a high degree of correlation among all the items from the three domains: differentiated instruction and feedback, interpersonal rapport, and a positive motivated learning climate. These findings supported our conceptualization of perceptions of teachers' caring behaviors as a unitary construct with multiple dimensions. Our study advanced the Li et al. (2013) conceptualization by providing initial evidence that the construct of perceptions of teachers' caring behaviors is unitary with multidimensions given the high correlations among three dimensions: differentiated instruction and feedback, interpersonal rapport, and a positive motivated learning climate. The measurement of perceptions of teachers' caring behaviors was PE specific and captured all domains or aspects of teacher-student interactions that occurred in PE and outside PE. Our study took an initial step to develop and validate a measurement to assess perceptions of teachers' caring behaviors in PE through an exploratory factor analysis. Further validation research is needed to confirm the multidimensional unitary construct of perceptions of teachers' caring behaviors in PE through a confirmatory factor analysis.

Students' attitude toward PE affects their learning in PE (Solmon, 2003) and exercise intention and behaviors outside school (e.g., Ferguson et al., 1989). To improve students' learning and engagement in PE and exercise behaviors outside school, it is critical for teachers to employ effective strategies to foster positive attitudes toward PE among their students. The motivational literature in PE has showed that a positive, motivating learning climate focusing on individual improvement and task mastery can enhance positive attitudes, enjoyment, and effort among students (e.g., Chen & Darst, 2001; Xiang et al., 2007). Adding to the motivational literature, our findings showed that participants who reported high levels of perceptions of teachers' caring behaviors were more likely to display

higher degree of positive attitudes toward PE. Participants who felt being cared for by teachers experienced higher levels of attitude-enjoyment and perceived PE as more attitude-useful. It is suggested a caring learning climate established by teachers can foster positive attitude toward PE among their students.

In response to the call for more research to identify effective strategies to increase students' enjoyment in PE (e.g., Prochaska et al., 2003; Sallis et al., 2000) and given the important role of effort in student learning in PE (e.g., Solmon, 2003), our study examined how students' perceptions of teachers' caring behaviors were related to students' perceived enjoyment and perceived effort in PE. The findings showed that participants who reported a high degree of being cared for in PE were more likely to experience more enjoyment and effort in PE. It is suggested that teachers should create a caring learning climate to enhance students' enjoyment and effort in PE. PE teachers can create a caring learning climate by utilizing strategies from the three dimensions such as breaking down complex skills into small parts for students to learn, respecting students, empowering students with choices, and greeting students when they enter the gym.

The previous literature has demonstrated a decline in students' attitudes toward PE, intrinsic motivation, and perceived enjoyment in PE as they progress in grade level (e.g., Barkoukis et al., 2010; Gao et al., 2009; Prochaska et al., 2003; Subramaniam & Silverman, 2007; Ullrich-French & Cox, 2014). Consistent with the literature, our findings showed that eighth grade participants reported lower levels of attitudes toward PE, perceived enjoyment, and perceived effort than these sixth graders. There were no significant differences in attitudes toward PE, perceived enjoyment, and perceived effort between sixth and seventh grade participants and between seventh and eighth grade participants. This reflects a general declining trend in students' motivation as they progress from sixth to eighth grade. As pointed out by Subramaniam and Silverman (2007), there are many possible explanations for this declining trend, including PE curriculum, teaching pedagogies, and students' developmental differences. Given the significant roles that students' attitudes toward PE, perceived enjoyment, and perceived effort play in developing and maintaining a healthy, physically active lifestyle, it is important

for PE teachers to take students' interests and preferences into consideration and select innovative curricular content and activities and employ effective motivational pedagogies to increase and sustain their attitudes toward PE and motivation in PE.

There are three limitations in our study. First, our survey contained 42 items, which are relatively lengthy for students to complete. To capture all aspects of caring teaching behaviors, we kept as many items as possible in this original version. Further research is needed to develop and validate a shorter version of this survey to reduce the burden for students to complete this survey. Secondly, we only conducted an exploratory factor analysis to identify the factor structure underlying all the items. To further validate the survey, a confirmatory factor analysis should be conducted in the future studies. Last, we used a self-report survey to assess students' perceived effort in our study. Future study should employ behavioral measurements such as physical activity and physical fitness, and skill performances to examine how perceptions of teachers' caring behaviors affect students' behaviors in PE.

Conclusions and Future Study

While recognizing the limitations, our study can potentially make great contributions to evolution of theory of caring and the literature on caring in PE. We took an initial step to challenge the traditional conceptualization of caring as a single-dimensional construct. The reconceptualization of caring as a unitary construct with multi dimensions have great potential to move forward the theory of caring in our field. This was the first study to develop and validate a measurement of perceptions of teachers' caring behaviors in PE. This valid and reliable self-report survey has potential to move forward this line of research on caring. The findings of our study also highlighted the importance of creating a caring learning climate in PE.

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PEDAGOGY

Measuring Student Motivation in High School Physical Education: Development and Validation of Two Self-Report Questionnaires

Lauren Sulz, Viviene Temple, Sandra Gibbons

Abstract

The aim of this research was to develop measures to provide valid and reliable representation of the motivational states and psychological needs proposed by the self-determination theory (Deci & Ryan, 1985, 2000) within a physical education context. Based on theoretical underpinnings of self-determination theory, two questionnaires were developed to measure students' motivation and psychological need satisfaction in high school physical education: (a) the Physical Education Motivation Scale (PEMS) and (b) the Physical Education Autonomy, Relatedness, Competence Scale (PE-ARCS). Validity and reliability concerning the scales were examined. Exploratory factor analysis supported the validity and test–retest reliability of a 3-factor, 9-item solution for PEMS and a 3-factor, 12-item solution for PE-ARCS. The results provide evidence supporting the validity and reliability of PEMS and PE-ARCS as promising physical education-specific measures of motivation developed within the framework of self-determination theory.

Lauren Sulz is assistant professor, Department of Secondary Education, University of Alberta. Viviene Temple is professor, School of Exercise Science, Physical and Health Education, University of Victoria. Sandra Gibbons is professor, School of Exercise Science, Physical and Health Education, University of Victoria. Please send author correspondence to lsulz@ualberta.ca

It is widely supported and acknowledged that school-based physical education programs present a tremendous opportunity to positively influence the attitudes and patterns of physical activity participation among adolescents (Alderman, Benham-Deal, Beighle, & Erwin, 2012; Basset et al., 2013; Chen, Kim, & Gao, 2014; Trudeau & Shephard, 2005). Motivation is recognized as an important factor related to meaningful student engagement and participation in physical education classes (Cox, Smith, & Williams, 2008; Ntoumanis, 2001; Shen, Li, Sun, & Rukaving, 2010). Motivation in physical education has been associated with a number of important outcomes, such as increases in physical activity levels during class time (Cox et al., 2008; How, Whipp, Dimmock, & Jackson, 2013; Lonsdale et al., 2013; Lonsdale, Sabiston, Raedeke, Ha, & Sum, 2009), intention to be physically active outside of class (Ntoumanis, 2001; Standage, Duda, & Ntoumanis, 2003), positive changes in the experiences of students within physical education (Ntoumanis, 2002; Standage, Duda, & Ntoumanis 2005; Zhang, 2009) and intention for future physical education participation (Shen et al., 2010). Therefore, it may be reasonable to assume that physical education programs will have a more positive impact when students are motivated to participate (Haerens, Kirk, Cardon, De Bourdeaudhuij, & Vansteenkiste, 2010; Ntoumanis, 2002). Despite the fact that motivation has been related to several positive outcomes in physical education, instruments used for assessing motivation in physical education settings have been adapted and/or modified from other domains. In light of this, the aim of this research was to develop theoretically grounded domain-specific valid and reliable measures of student motivation in physical education contexts.

Self-Determination Theory

Within physical education, self-determination theory (Deci & Ryan, 1985) is a commonly used theoretical framework to study motivation given that its major propositions and constructs are significantly pertinent in physical education settings (Ntoumanis & Standage, 2009). Self-determination theory postulates that providing students with a social context that satisfies three innate psychological needs of autonomy, relatedness, and competence one's motivation can be positively influenced (Deci & Ryan, 1985, 2000; Vallerand, 2001). The need for autonomy represents an individual's

desire to experience a sense of choice and feel volition in carrying out a task (Deci & Ryan, 1985, 2000). According to the theory, individuals feel autonomous when they understand the value or relevance of the task and therefore can identify with it (Deci & Ryan, 2000; Ryan & Deci, 2000). Relatedness refers to an individual's inherent desire to feel connected to others (Deci & Ryan, 1985, 2000). Ryan and Deci (2000) suggest relatedness support is important, as people are not inclined to internalize value from those they do not feel connected to. Last, the need for competence represents an individual's inherent desire to feel effective in their environment (Deci & Ryan 1985, 2000). Feelings of competence are necessary for individuals to approach optimal challenge that allow them to learn and develop (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000). Specifically, if students' need for autonomy, relatedness, and competence are met they will experience self-determined motivation. In contrast, when these basic psychological needs are thwarted, the associated benefits are diminished and low motivation or avoidance will result (Deci & Ryan, 1985, 2000).

According to Deci and Ryan (1985, 2000) and Hagger and Chatzisarantis (2007), one's motivation can be broadly categorized as intrinsically motivated (e.g., doing something because it is inherently interesting and enjoyable), extrinsically motivated (e.g., pursing an activity for reasons outside the activity itself, such as, external rewards or pleasurable psychological states), or amotivated (e.g., lack of motivation or passive contribution) based on the different reasons or goals that accompany an action. Each motivational state is projected to have a variety of consequences for learning, performance, development, and personal experience. Several studies have demonstrated that intrinsic motivation is associated with positive behavioral outcomes, such as increased physical activity levels activity levels in and out of physical education class (Cox et al., 2008; Lonsdale et al., 2009; Lonsdale et al., 2013; Ntoumanis, 2001; Shen et al., 2010) and affective outcomes, such as increased enjoyment (Cox, Duncheon, & McDavid, 2009; Zhang, 2009) and happiness (Standage et al., 2005). These findings highlight the importance of understanding the motivational processes that can determine students' effort, interest, and attitude towards physical education and their future involvement in physical activity.

Measures of Motivation in Physical Education

To date, measures have been developed to assess motivation in sport contexts (e.g., Intrinsic Motivation Scale, McAuley, Duncan, & Tammen, 1989; Sports Motivation Scale, Pelletier et al., 1995), exercise settings (e.g., Exercise Motivation Scale; Li, 1999; Basic Need Satisfaction Scale, Vlachopoulos, & Michailidou, 2006), and specific activities (e.g., Situational Motivational Scale, Guay, Vallerand, & Blanchard, 2000). However, domain-specific scales that assess the three motivational states and three psychological needs posited by self-determination theory within physical education contexts are limited within the literature.

To address this, researchers adapt existing motivational scales by altering the stem question and/or scale item(s) to fit the physical education context or by using an abridged version of a preexisting measurement scale. For example, researchers (e.g., Granero-Gallegos, Baena-Extremera, Gomez-Lopez, & Abraldes, 2014; Granero-Gallegos, Baena-Extremera, Perez-Quero, Ortiz-Camacho, & Bracho-Amador, 2012; How et al., 2013; Ward, Wilkinson, Vincent, & Prusak, 2008) have adapted the Sport Motivation Scale (Pelletier et al., 1995), which was designed to measure motivation toward sport, for the physical education context by using an abridged version (16-item version of the original 28-item scale) and by changing the original stem question ("Why do you participate in sport?") to fit physical education contexts (e.g., "Why do you participate in physical education?"). This adapted stem question may not be applicable to physical education contexts as full volition cannot be granted due to curricula objectives and student behaviors being influenced by teachers and grades. Likewise, when assessing the three psychological needs posited by self-determination theory, a common practice among researchers is to use subscales from existing questionnaires to measure each individual construct. For instance, researchers (e.g., Cox et al., 2008; Lonsdale et al., 2013; Standage & Gillison, 2007; Standage, Treasure, Duda, & Prusak, 2003a; Taylor, Ntoumanis, Standage, & Spray, 2010) have assessed autonomy from the 5-item autonomy subscale of the Situational Motivation Scale, assessed competence by using the perceived competence subscale (5 items) from McAuley et al. (1989) 18-item Intrinsic Motivation Inventory and assessed relatedness through the adaption of the

Need for Relatedness Scale (Richer & Vallerand, 1998), which originally was developed for relatedness in the workplace. Researchers are using multiple subscales from existing questionnaires because a measure that assesses all three psychological needs posited by self-determination theory in physical education settings is limited within the literature. Using instruments designed for other contexts does not adequately address the unique context of the physical education environment and jeopardizes the original instruments' validity and reliability.

To help address these issues, researchers have validated the altered versions of the questionnaires in physical education settings. However, the majority of this work has been focused on middle school contexts. For example, Standage et al. (2003a) assessed the validity and reliability of the 14-item abridged Situational Motivation Scale used by numerous researchers (e.g., Lonsdale et al., 2009; Lonsdale et al., 2013; Moreno, Gonzalez-Cutre, Martin-Albo, & Cervello, 2010; Ward et al., 2008) among students in middle school physical education (Grades 7 and 8). The authors concluded the 14-item Situational Motivation Scale measure is a valid and reliable tool for assessing situational motivation in middle school physical education settings. Moreover, Goudas, Biddle, and Fox (1994) adapted the Self-Regulation Questionnaire (Ryan & Connell, 1989), which assessed intrinsic and extrinsic forms of motivation and added the amotivation scale from the Academic Motivation Scale (Vallerand et al., 1992) to measure types of behavioral regulation in physical education and sport contexts. This questionnaire has been used by researchers in physical education contexts (e.g., Ntoumanis, 2002; Ntoumanis, 2005; Shen, McCaughtry, & Martin, 2007) and shown to be valid and reliable among 12- to 14-year-old physical education students. Further, Lui and Chung (2014) developed and validated a measure designed for assessing psychological need satisfaction in middle school students (Grades 7 to 9) in Hong Kong. In studies examining the motivational processes of high school students (e.g., How et al., 2013; Granero-Gallegos et al., 2012; Granero-Gallegos et al., 2014), instruments designed to measure motivation in other contexts (e.g., sport contexts) that have been adapted for physical education settings (e.g., Sport Motivation Scale, Pelletier et al., 1995) and validated by others tend to be used. For example, Granero-Gallegos

et al. (2014) used the Sport Motivation Scale (Pelletier et al., 1995), which was previously validated by Moreno, Llamas, and Ruiz (2006) to assess the motivation of high school students in physical education. As the motivational processes of middle school students and the structure of middle school physical education classes likely differ from that of high school students and high school physical education programs, and the physical education setting differs from that of other contexts, the development and validation of domain-specific measures of high school physical education is warranted.

In sum, an instrument that measures the three broad motivational states in high school physical education (Grades 9 to 12; students 14 to 18 years of ages) and an instrument that measures all three psychological needs in high school physical education classes are limited within the literature. As such, there is a considerable scope for the development and validation of measures of motivation in high school physical education contexts. The present study sought to develop two domain-specific questionnaires to provide valid and reliable representation of the motivational states and psychological needs proposed by self-determination theory within high school physical education contexts. The Physical Education Motivation Scale (PEMS) was developed to measure students' state of motivation (intrinsic motivation, extrinsic motivation, amotivation) and the Physical Education Autonomy, Relatedness, Competence Scale (PE-ARCS) was developed to measure students psychological need satisfaction (autonomy, relatedness, and competence).

Method

The development of PEMS and PE-ARCS followed recommendations within the literature regarding scale development. Worthington and Whittaker (2006) and Cabrera-Nguyen (2010) discuss recommendations for best practices in scale development research. The recommendations from the authors included (a) conducting exploratory factor analysis to assess underlying factor structure and refine pool items as early stage scale development, (b) providing definitions of the constructs to be measured, (c) having experts review the item pool to confirm or invalidate the definitions of constructs and evaluate items for clarity and conciseness, and (d) follow DeVellis' (2003) steps to scale development as a sequence of steps to be taken prior to factor-analytic techniques.

DeVellis' (2012) eight steps to developing measurement scales were adhered to in the development of PEMS and PE-ARCS. Because theory aids the conceptualization of constructs (DeVellis, 2012), all constructs were aligned with self-determination theory and clearly defined at the beginning of the development process. Following a literature search of the constructs of interest, a large pool of items for each scale was developed (39 items for PEMS and 53 items for PE-ARCS). Items were generated from existing measures of motivation and psychological needs within other settings (e.g., exercise, sport, workplace) and were modified for the physical education context. A 7-point Likert scale was chosen for both questionnaires, as this format allowed participants to select a neutral point while giving them two choices between the extremes of the scale. Once the initial questionnaires were constructed, a Delphi Group composed of a panel of six experts (five professors and one graduate student in related fields—physical education pedagogy with prior research with SDT) were asked to review the initial pool of items and evaluate (a) whether the items captured the essence of the construct being assessed, (b) if the items were theoretically grounded, and (c) if the wording of each item was age appropriate and relevant to physical education. Specifically, experts were asked to identify the subscale each proposed item corresponded with (i.e., autonomy, competence, relatedness; intrinsic motivation, extrinsic motivation, amotivation) or if the item corresponded with more than one subscale or no subscale. Experts were also asked to review items for relevance, wording, and reading level. Based on the above criteria and the feedback provided by the Delphi Group, we revised and adjusted the items accordingly. The revisions resulted in a reduced item pool of 27 items for PEMS (intrinsic motivation: 8 items; extrinsic motivation: 11 items; amotivation: 8 items) and 20 items for the PE-ARCS (autonomy: 7 items; relatedness: 6 items; competence: 7 items). These versions of the questionnaire were administrated to a sample of high school students to examine construct validity via exploratory factor analysis and to establish test–retest reliability.

Participants

Validation sample. High school students from four urban and suburban public high schools in Western Canada (N = 309; 154 female, 155 male) participated in the validation study. Students were

in Grades 9–12 and ranged in age from 14 to 18 years (M = 15.50, SD = 1.11).

Test–retest (reliability) sample. The reliability sample composed of 131 students (64 females, 67 males) in Grades 9–12. The participants were recruited from four physical education classes within two of the schools that participated in the validation study. Participants' age ranged from 14–18 years old (M = 15.53; SD = 1.12).

Data Collection Procedures

University and school board ethical approval were obtained and all students provided written informed consent. Questionnaires were mailed to the schools and administered by the physical education teacher during approximately 20 min of one physical education class. Students were informed participation was voluntary; they could decide not to participate at any time or choose not to answer any questions they did not feel comfortable with. Teachers were asked to ensure students were informed of the purpose of the study, understood that their answers would be kept confidential and used for research purposes only, and the teacher would not see their responses. Teachers were asked to place questionnaires into the provided envelope, seal, and return to researcher after completion to ensure confidentiality and anonymity. Students were also informed the questionnaire was not an examination; therefore, there were no right or wrong answers. Students were instructed to answer the questions as honestly as possible and base their answers on their current physical education experiences. The retest to establish reliability occurred 5 days after the initial questionnaire administration. The teachers used prepaid envelopes to return questionnaires to the University.

Data Analyses

Prior to performing exploratory factor analysis, variables were examined for normality and were considered to be nonnormal if their skewness and kurtosis values extended the acceptable limit of ±2.0 (Tabachnick & Fidell, 2012). Although the majority of items did not have severe violations of normality, preliminary analysis indicated that the data distribution for PEMS and PE-ARCS was nonnormal with a few items deviating from normality. To account for non-normal data, principal axis factoring using varimax rotation was performed (Fabrigar, Wegener, MacCallum, & Strahan, 1999).

Outlier scores were considered within the normal range (below -3.29 and above 3.29), as identified by Tabachnick and Fidell (2012). Construct validity was examined using scree plots and exploratory factor analysis. For the rotated solution, items with eigenvalues below 1.0 (Stevens, 2001) and items with primary loadings of < .50 and secondary loadings of > .32 were removed (Tabachnick & Fidell, 2012). To examine the test–retest reliability of the scales, intraclass correlation coefficients (ICC) were applied.

Results

The following section presents the results of exploratory factor analyses and test–retest reliability of PEMS and PE-ARCS. The factor structure and corresponding factor loadings are presented for each scale. Reliability of subscales are also presented with item means, standard deviations, and corresponding ICC values.

Physical Education Motivation Scale (PEMS)

An exploratory factor analysis was conducted on the 27-item scale administered to the students to identify underlying factors. Employing multiple iterations with the criteria set out by Stevens (2001) and Tabachnick and Fidell (2012) and being consistent with the theoretical framework, an acceptable fit model was determined with 3-factor, 9-items solution: 3 intrinsic motivation items, 3 extrinsic motivation items, 3 amotivation items (Table 1; Appendix A). A corresponding scree plot verified the solution and eigenvalues for each of the factors were above 1.0, which is deemed an acceptable criterion (Stevens, 2001). The final 3-factor, 9-item model resulted in 57.3% of the variance accounted for; explaining 23.5% of the variance in intrinsic motivation, 17.1% of the variance in extrinsic motivation, and 16.7% of the variance in amotivation. Test–retest reliability results for final model of PEMS are shown in Table 2. The results revealed substantial levels of test–retest reliability for PEMS and substantial to excellent levels of stability for the subscales (Landis & Koch, 1977).

Table 1
Physical Education Motivation Scale (PEMS) Items and Corresponding Factor Loadings

PEMS item	Factor 1: Intrinsic Motivation	Factor 2: Extrinsic Motivation	Factor 3: Amotivation
Intrinsic Motivation			
I participate in physical education because it is fun	.90		
I participate in physical education because it is interesting	.74		
I find physical education enjoyable	.82		
Extrinsic Motivation			
I try to do well in physical education so my teacher will think I am a good student		.79	
I try hard in physical education because I want a good grade		.61	
I do my best so my physical education teacher will like me		.70	
Amotivation			
I don't see the point in participating in physical education			.62
I don't see why I have to take physical education			.89
Physical education is a waste of my time			.50
Explained Variance	23.5%	17.1%	16.7%

Table 2
Test–Retest Reliability of the Physical Education Motivation Scale (PEMS) and Subscales

	Time 1		Time 2			
Scale/Subscale	***M***	***SD***	***M***	***SD***	***p***	**ICC**
PEMS	36.42	6.47	37.05	6.70	.13	.75
Intrinsic Motivation	16.74	4.18	17.00	3.94	.22	.82
Extrinsic Motivation	13.95	4.62	14.27	4.70	.27	.75
Amotivation	5.73	3.91	5.77	4.11	.86	.73

Physical Education Autonomy, Relatedness, Competence Scale (PE-ARCS)

Similar to PEMS, an exploratory factor analysis was conducted on the PE-ARCS 20-item scale to identify underlying factors. Using the criteria set out by Stevens (2001) and Tabachnick and Fidell (2012) multiple iterations were employed and an acceptable fit model was determined with 3-factor, 12-item solution: 4 autonomy items; 4 relatedness items; 4 competence items (Table 3; Appendix B). A corresponding scree plot verified the solution and eigenvalues for each of the factors were above 1.0 (Stevens, 2001). The final 3-factor, 12-item model resulted in 64.1% of the variance accounted for; explaining 18.6% of variance in autonomy, 23.1% of variance in relatedness, and 22.4% of variance in competence. Test–retest reliability ICCs for the final model of the questionnaire and subscales can be found in Table 4. Similar to PEMS, PE-ARCS demonstrated excellent test–retest reliability (Landis & Koch, 1977).

Table 3
Physical Education Autonomy Relatedness Competence Scale (PE-ARCS) Items and Corresponding Factor Loadings

PE-ARCS item	Factor 1: Autonomy	Factor 2: Relatedness	Factor 3: Competence
Autonomy			
I choose which activities I want to practice	.70		
I make a lot of my own decisions	.57		
I have input in which skills I want to practice	.63		
I am doing what I want	.75		
Relatedness			
My classmates seem to like me		.75	
I really like the people I am with		.74	
I feel my classmates accept me		.81	
I feel connected to my classmates		.76	
Competence			
I am good at the things we do			.78
I am able to perform well			.82
I feel skilled			.79
I am confident in my ability			.59
Explained variance	18.6%	23.1%	22.4%

Table 4
Test–Retest Reliability of the Physical Education Autonomy, Relatedness, and Competence Scale (PE-ARCS) and Subscales

	Time 1		Time 2			
Scale/subscale	***M***	***SD***	***M***	***SD***	***p***	**ICC**
PE-ARCS	62.75	12.35	62.50	11.95	.68	.84
Autonomy	18.90	5.08	18.77	5.48	.65	.81
Relatedness	21.80	4.89	21.69	4.70	.67	.79
Competence	22.05	4.53	22.04	4.42	.98	.74

Discussion

The purpose of this study was to develop, validate, and establish test–retest reliability of two questionnaires, PEMS and PE- ARCS, to assess domain-specific motivational states and psychological need satisfaction in high school physical education contexts. We found initial evidence of validity and reliability of scores from PEMS and PE-ARCS that could be used in high school physical education settings as measures of motivational state and satisfaction of autonomy, relatedness, and competence. The fundamental premise of self-determination theory is that individuals need to feel self-determined, connected and competent within their social environment in order to elevate their levels of motivation and receive the physical, cognitive, and affective benefits (Deci & Ryan, 1985; 2000). In physical education, it is essential the ways in which students are motivated be understood in order to assist physical education programs in providing positive physical activity experiences. Overall, our findings indicate PEMS and PE-ARCS have utility in measuring high school students' motivation and psychological need satisfaction within physical education settings.

The results from exploratory factor analysis revealed that PEMS had a 3-factor structure that represented intrinsic motivation, extrinsic motivation, and amotivation. This 3-factor, 9-item solution accounted for 57.3% of the total variance, which is parallel with measures of motivation within other contexts. For example, the Situational Motivation Scale (Guay et al., 2000), which measures motivation in education settings, accounted for 65% of total variance. One of the largest contributors to explained variance of PEMS was intrinsic

motivation accounting for 23.5% of the variance. This also parallels the finding from the Situational Motivation Scale, in which intrinsic motivation accounted for the greatest amount of variance (35.1%; Guay et al., 2000). The slight differences in total variance accounted for between PEMS and the Situational Motivation Scale (57.3% vs. 65%) and the difference in variance accounted for by intrinsic motivation (23.5% vs. 35.1%) may be attributed to the different study populations. The participants who took part in the study conducted by Guay et al. (2000) were college students engaging in an academic activity in their college library (e.g., reading a book for a course, completing an assignment). As college students might have greater autonomy over educational activities in comparison to students in high school physical education classes, it is likely the students participating in Guay et al. (2000) possess different motivational processes than students in the current investigation. The factor contributing the least explained variance was amotivation, which accounted for 16.7% of explained variance of PEMS. In physical education context, true forms of amotivation are not often attainable, as their physical education teacher monitors students' behaviors and their class grade is dependent on their actions. As such, students may be more extrinsically motivated by teacher acceptance and/or a good grade, which may explain the low accounted variance of amotivation. Although students may not be completely amotivated due to the external pressures, amotivation accounted for 16.7% of explained variance of PEMS, implying that amotivation is an important construct in measuring students' motivation in physical education.

The exploratory factor analysis for PE-ARCS supported a 3-factor, 12-item solution inline with the psychological needs of self-determination theory. PE-ARCS accounted for 64.1% of the variance. Although, all three constructs were strong contributing factors, relatedness emerged as the strongest factor accounting for 23.1% of the explained variance. This finding contradicts other scales measuring self-determination theory constructs in other physical activity settings in which autonomy and competence were stronger factors in comparison to relatedness. For example, Vlacholpoulos and Michailidou (2006) developed and validated the Basic Psychological Needs in Exercise Scale to measure autonomy, relatedness, and competence in exercise settings and found when examining the contribution of relatedness in the prediction of the outcomes, relatedness

did not contribute to the prediction of any of the outcomes. These findings may be explained by Deci and Ryan's (2000) proposition that the need for relatedness in certain situations may be less influential on one's intrinsic motivation, particularly in settings in which people engage in a behavior in isolation, such as exercise settings. Bryan and Solmon (2007) affirm Deci and Ryan's (2000) proposition and suggest that relatedness is thought to be a lesser consequence of intrinsic motivation than autonomy and competence, due to the notion that an individual can be intrinsically motivated to engage in an activity without the connection to another person. However, physical education is a unique context in which 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 in order to intrinsically motivate students in physical education settings. Cox et al. (2009) found students who felt accepted by their classmates and supported by their teacher in physical education experienced a sense of relatedness, which was indirectly associated to motivational consequences such as enjoyment. Moreover, Cox and Williams (2008), Shen, McCaughtry, Martin, and Fahlman (2009) and Standage et al. (2005) reported that physical education teachers' relatedness support was directly associated to students state of motivation. Ferriz, Sicilia, and Saenz-Alvarez (2013) also found the satisfaction of the need for relatedness to be a significant predictor of intrinsic motivation and student satisfaction in physical education. Therefore, the findings of this study confirm the distinctiveness of the physical education context. On this basis, researchers are encouraged to use the PE-ARCS as a measure of self-determination theory constructs within high school physical education contexts to account for the importance of the relatedness construct.

Similar to relatedness, the role of competence and autonomy on students' motivational states in physical education settings is unique to that of other physical activity contexts. Within the literature, perceived competence frequently emerges as a crucial construct in predicting student motivation in physical education (Ferrer-Caja & Weiss, 2000; Ntoumanis, 2001; Standage, Gillison, & Ntoumanis, Treasure, 2012) as the public nature of physical education makes it unlikely for students who doubt their competence in physical activi-

ties to maintain active engaged involvement. Moreover, providing an autonomy-supportive environment in physical education has been shown to be an important factor in positively enhancing one's motivation during physical education class time (Lonsdale et al., 2009; Lonsdale et al., 2013; Prusak, Treasure, Darst, & Pangrazi, 2004; Ward et al., 2008). It must be noted autonomy in physical education is not equivalent to complete independence, rather a level of choice regarding decisions made throughout the lesson (e.g., equipment choices, activity choices; Bryan & Solmon, 2007). This becomes important, as physical education is a distinctive context in which full autonomy cannot be granted due to teacher and curricular responsibilities, which make autonomy in physical education settings unique in comparison to autonomy in other physical activity contexts.

The present study can be considered of importance as it addressed a gap in the literature by developing two domain-specific measures allowing researchers to evaluate students' motivation and psychological need satisfaction in high school physical education programs. While the current findings are indicative of PEMS and PE-ARCS potential to assess students' motivational state and the psychological needs posited by self-determination theory, respectively, a few issues must be acknowledged and future directions outlined. We attempted to develop and validate both questionnaires for high school students in Grades 9–12; however, in the location in which data was collected, physical education programs in Grades 11 and 12 are elective courses. As such, students who choose to enroll in physical education in Grades 11 and 12 may have different motivational processes than those students in mandatory physical education programs. Research has shown a link between motivation and enrolment in physical education programs (Ferrer-Caja & Weiss, 2002; Ntoumanis, 2005), therefore future work should confirm the present findings with samples of Grade 11 and 12 students who are required to participate in physical education as factors such as autonomy may differ among students who willingly enrolled in elective physical education programs. It is also recognized that future work on PEMS and PE-ARCS may require a confirmatory factor analysis for each scale. Confirmatory factor analysis will explicitly test the model proposed by the exploratory factor analysis and is the next logical step in the validation of PEMS and PE-ARCS.

In conclusion, the importance of physical education in fulfilling its principle objective of positively affecting students' physical activity behaviors both in and out of physical education class and establishing positive affective states toward physical activity, is arguably underpinned by understanding student motivation. The low levels of physical activity among youth is becoming a public health concern and physical education programs have been repeatedly and consistently identified as a key setting for the promotion of lifelong activity participation. Our findings provide valid and reliable instruments, which can be used to assist in the understanding of student motivation in high school physical education classes.

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Appendix A

Physical Education Autonomy Relatedness Competence Scale (PE-ARCS)

We are interested in your experiences in physical education (PE) class. Using the scale below, please indicate by circling, to what extent each of the following items is true for you. Please note that there are no right or wrong answers and no trick questions. We simple want to know how you personally feel about PE.

When I am in PE...	Strongly disagree			Neutral			Strongly agree
1. My classmates seem to like me	1	2	3	4	5	6	7
2. I am good at the things we do	1	2	3	4	5	6	7
3. I can choose which activities I want to practice	1	2	3	4	5	6	7
4. I really like the people I am with	1	2	3	4	5	6	7
5. I am able to perform well	1	2	3	4	5	6	7
6. I make a lot of my own decisions	1	2	3	4	5	6	7
7. I feel like my classmates accept me	1	2	3	4	5	6	7
8. I feel skilled	1	2	3	4	5	6	7
9. I have input in which skills I want to practice	1	2	3	4	5	6	7
10. I feel connected to my classmates	1	2	3	4	5	6	7
11. I am confident in my ability to learn	1	2	3	4	5	6	7
12. I am doing what I want	1	2	3	4	5	6	7

Codification key: Autonomy items: Items 3, 6, 9, 12; Competence items: Items 2, 5, 8, 11; Relatedness items: Items 1, 4, 7, 10.

Appendix B

Physical Education Motivation Scale (PEMS)

We are interested in your experiences in physical education (PE) class. Using the scale below, please indicate by circling, to what extent each of the following items is true for you. Please note that there are no right or wrong answers and no trick questions. We simple want to know how you personally feel about PE.

When I am in PE...	Strongly disagree			Neutral			Strongly agree
13. I participate in PE because it is fun	1	2	3	4	5	6	7
14. I try to do well in PE so my teacher will think I am a good student	1	2	3	4	5	6	7
15. I don't see the point of participating in PE	1	2	3	4	5	6	7
16. I participate in PE because it is interesting	1	2	3	4	5	6	7
17. I try hard in PE because I want a good grade	1	2	3	4	5	6	7
18. I don't see why I have to take PE	1	2	3	4	5	6	7
19. I find PE enjoyable	1	2	3	4	5	6	7
20. I do my best so my PE teacher will like me	1	2	3	4	5	6	7
21. PE is a waste of my time	1	2	3	4	5	6	7

Codification key: Intrinsic motivation items: Items 1, 4, 7; Extrinsic motivation items: Items 2, 5, 8; Amotivation: Items 3, 6, 9

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PHYSICAL ACTIVITY

Effects of a Bug-in-the-Ear Intervention to Increase Physical Activity Prompting and Level During Preschool Recess

David Kahan, Virginie Nicaise, Karen Reuben

Abstract

Teacher prompting is a means to increase preschool children's physical activity. Twelve 4- and 5-year-olds at one preschool in the southwest U.S. participated in an ABA prompting intervention that utilized a bug-in-the-ear device to signal teachers to prompt sedentary children to increase physical activity level during unstructured recess. RM-ANOVA was used to analyze prompt rate across phases and visual analysis and Tau-U were used to analyze physical activity level (measured by accelerometry and systematic observation) across phases for the entire recess period (i.e., macro analysis). The latter methods were also used to compare accelerometer activity counts pre- and post prompt (i.e., microanalysis). Prompt rate was near zero at baseline; rose greater than 24-fold during intervention; and then dropped to near-baseline level at withdrawal. For observational data, sedentary activity and light and moderate-to-vigorous physical activity (MVPA) were statistically significantly lower and higher, respectively, during the intervention than at baseline/with-

David Kahan is a professor in the School of Exercise and Nutritional Sciences, San Diego State University. Virginie Nicaise is a research professor at Université Claude Bernard Lyon 1, Lyon, France. Karen Reuben was a graduate student at San Diego State University at the time of this study. Please send author correspondence to dkahan@mail.sdsu.edu

drawal. For accelerometry data, only MVPA was statistically significantly higher during the intervention than at baseline/withdrawal. Microanalysis revealed that post prompt physical activity rose and exceeded the light intensity threshold when teachers initiated prompts and rose but did not exceed the light intensity threshold under intervention prompting conditions. Prompting stimulates light physical activity immediately after sedentary activity is detected and decreases overall sedentary activity over an entire recess period.

Adequate physical activity in the early years can help children develop fundamental motor skill competence, which can facilitate engagement in regular physical activity in the future (Stodden et al., 2008). The National Association for Sport and Physical Education (2011) recommends that preschool-age children engage daily in 2 hr of structured and unstructured physical activity. Approximately 64% of preschool-age children attend part- or full-day preprimary programs (U.S. Department of Education, National Center for Education Statistics, 2013). Thus, the physical and social environments of a facility are crucial to the formation of children's physical activity habits. The Institute of Medicine (IOM) recommends that preschools provide children opportunities for light physical activity and moderate-to-vigorous physical activity (MVPA) of at least 15 min/hr (IOM, 2011). Unfortunately, multiple studies have shown that children are at best achieving only half this recommendation (i.e., < 60 min of MVPA over an 8-hr day; Reilly, 2010).

Preschool children are typically afforded up to three recess periods daily (Story, Kaphingst, & French, 2006). During recess, a child has free time in an unstructured environment, and children in such settings may be more likely to participate in MVPA than during structured play (Pate, Baranowski, Dowda, & Trost, 1996). In fact, children in unstructured outdoor play have been shown to accumulate as many as 34 min/day of MVPA (Ridgers, Stratton, & Fairclough, 2006). Correlates of MVPA during outdoor recess in preschools differ by gender and are particular to a setting. For example, playground density and recess duration were shown to be inversely correlated with child step counts regardless of gender while soft ground surfaces and presence of a teacher were inversely correlated with step count for boys and girls, respectively (Cardon, Van Cauwenberghe, Labarque, Haerens, & De Bourdeaudhuij, 2008). In

another study, MVPA was greater when children played with balls/objects, in open space, with fixed equipment, or with wheeled toys compared to when they played with creative play objects; when they and not teachers initiated activity; and when they played solitarily, with a peer, or with a group compared to playing when an adult was present (Brown, Googe, McIver, & Rathel, 2009). In previous work (Nicaise, Kahan, & Sallis, 2011), MVPA was found to be greater (a) for boys and normal weight children compared to girls and overweight children; (b) when children played on grass or a playground compared to cement surfaces; (c) when children played with balls, wheeled objects, or in open space compared to fixed equipment; and (d) when children played solitarily or with a peer compared to in a group. Collectively, these and other correlational studies suggest policies and practices that could increase MVPA levels but must still be formally evaluated.

Interventions that are designed to increase physical activity in child care settings are categorized into curriculum and environmental/policy strategies (Ward, Vaughn, McWilliams, & Hales, 2010). Most outdoor interventions have focused on environment/policy because curriculum-based interventions run contrary to the purpose of unstructured outdoor play. Stratton (2000) studied the effects of adding colored markings to the playground and found an increase of approximately 6 min of MVPA per play period (2.5 times that of the control group). In another study, providing an additional 30 min of structured outdoor playtime triweekly resulted in the experimental group accumulating only 1.5 more min of MVPA than children in an unstructured play control group (Alhassan, Nwaokelemeh, Lyden, Goldsby, & Mendoza, 2013). Collectively, these studies suggest that interventions that solely focus on manipulating the physical environment can be successful, but that physical activity is still insufficient. Thus, it is important to also examine the effects of social interventions.

Several aforementioned correlates of playground MVPA allude to the social environment's role in physical activity promotion. Teachers are part of the social environment and teacher–child interactions are a means of affecting physical activity through modeling, demonstration, instruction, participation, acknowledgment, and prompting. Calls have been made to study the "impact of adult

behaviors (e.g., prompting, encouragement, participation) upon the physical activity of young children" (Emma & Jarrett, 2010, p. 15). Of these strategies, prompting may be particularly beneficial because of its immediate effect. Indeed, in the home setting, prompting of activity by parents was significantly correlated (r = .47) with subsequent child vigorous physical activity (Klesges, Malott, Boschee, & Weber, 1986), and prompting of activity by nonparent adults was significantly correlated (r = .44) with child energy expenditure (Sallis et al., 1993).

Prompting involves an antecedent stimulus and behavior chain (Cooper, Heron, & Howard, 1987), and has been identified as one of 26 distinct behavior change techniques (Abraham & Michie, 2008). In the present study, the antecedent stimulus was the researcher's observation of a participant engaged in sedentary activity for two consecutive 30-s intervals. This in turn set off a "specific sequence of responses, each associated with a particular stimulus condition" (Cooper et al., 1987, p. 339). Namely, using a bug-in-the-ear device (BIE), a researcher prompted (i.e., researcher-initiated prompt [RIP]) a participant's assigned recess teacher to prompt that child to perform a higher-intensity alternative activity. In turn, the teacher verbally prompted the participant, who in turn acted (or not) in response to the teacher's prompt.

Previous research on physical activity prompting in preschools is sparse and descriptive-correlational in nature. As a percentage of directly observed intervals, teacher positive prompting of physical activity was rare in all observed locations (combined indoors-outdoors = 2.0%, Brown, Pfeiffer, et al., 2009; outdoors only < 5.0%, Gubbels et al., 2011; McKenzie et al., 1997). Despite its scarcity, prompting was significantly associated with higher levels of physical activity (β = .39, Gubbels et al., 2010). Moreover, preschool children tended to comply with physical activity prompts at a high rate (89.5%; McKenzie et al., 1997); however, the authors did not differentiate compliance rates between peer and teacher prompts. A prompting intervention seems a reasonable next step in light of the limits of descriptive-correlational studies as well as an absence of interventions that included only prompting. (Brown, Googe, et al., 2009, investigated a seven-component prompting intervention but did not analyze prompting's distinct effect.)

Ideally, a prompting intervention should focus on changing school staff behavior; however, this was not the aim of our current study. Preschool teachers perceive many barriers to taking children outdoors to play, including their own dislike of being outdoors, the additional work involved, and low physical activity self-efficacy (Copeland, Kendeigh, Saelens, Kalkwarf, & Sherman, 2012), all of which may negatively affect physical activity prompting. Moreover, many teachers may view prompting children to engage in MVPA as being incompatible with their primary role of ensuring playground safety (Coleman & Dyment, 2013). Teachers may also not be aware of how sedentary children are, not have the training to intervene, or even be philosophically opposed to the notion that children be told to engage in physical activity during their recess periods (Coleman & Dyment, 2013).

The purpose of our study was to investigate the effects of a prompting intervention on outdoor physical activity during recess among preschool children who previously demonstrated a high level of sedentary activity. We asked the following questions:

1. What is the context under which sustained sedentary activity is performed (i.e., necessitating a RIP)?
2. What is the basal rate of teacher-initiated prompting (TIP)? How does this rate change when teachers are aware of being observed? How does it change in the presence of RIP?
3. Does whole recess physical activity level change as a result of TIP/RIP?
4. Does post prompt physical activity level increase over preprompt level as a result of TIP/RIP?

Method

Participants and Setting

Four- and 5-year-old children (n = 12), enrolled in a university preschool located in a large city in the southwest United States, participated in the study. (See Table 1 for individual child demographic characteristics.) They were among 23 of the least active (upper tertile: sedentary activity$_{\text{accelerometer}}$ > 60.5% recess time) of 67 children who had participated in a previous study (Nicaise, Kahan, Sallis, & Reuben, 2012). Data were collected on 38 days over 10 weeks from

March through May 2011. Written informed parental consent was provided in accordance with institutional review board approval.

Table 1
Characteristics of the Sample (n = 12)

						Schedule of Phase Measurement (Day)		
Child	Gender	Ethnicity	Age	BMI percentile	Previous SED percentage	Baseline	Intervention	Postintervention
Allie	F	White	4.6	37.4	74.1	2,8	14,21,25	34
Avery	F	White	4.8	70.1	67.9	4,9	17,26,32	36
Casey	F	White	4.4	11.1	93.4	1,10	18,23,27	37
Cate	F	White	5.0	93.0	73.9	6,13	28,31,33	38
Emelyn	F	White	5.2	28.7	71.1	3,8	16,21,30	37
Helena	F	Black	4.6	92.0	69.0	3,8	17,23,30	38
Jason	M	White	4.6	25.4	83.3	10,12	19,24,31	36
Josie	F	Asian	4.7	65.7	61.1	4,11	18,22,29	35
Katyana	F	White	5.0	30.9	67.7	5,7	15,19,26	33
Leila	F	Asian	4.9	8.3	69.4	3,9	16,20,27	34
Nathan	M	Hispanic	4.5	31.6	79.6	2,7	14,20,25	35
Taylor	M	White	4.6	43.1	67.2	5,7	15,22,28	33

Note. BMI percentile is specific to age and gender. Previous SED Percentage refers to percentage of sedentary intervals across three recess observations from a previous study (Nicaise et al., 2012) that were used to determine eligibility for the present study.

The intervention focused on unstructured recess conducted in a large shared use outdoor playground. Detailed descriptions of the playground's zones and amenities have been previously reported (Nicaise et al., 2011). Twelve female teachers were involved across data collection phases; two were full-time lead teachers and the remaining 10 were part-time assistant teachers majoring in child and family development studies. Two weeks prior to baseline, all teachers who worked in the participating children's classrooms attended a mandatory monthly staff-development program. At that time, general procedures were explained with no teacher opting out of potential involvement.

Design and Procedures

We used an ABA multiple-baseline-across-subjects withdrawal design. (See Table 1 for the measurement schedule for each child. Scheduling depended on whether a child attended 2, 3, or 5 days weekly; was absent from school; and whether a child was amenable to wearing an accelerometer on a given day.) In general, a lead teacher randomly assigned assistant teachers to supervise participating children. During the study, we observed each child for the duration of the outdoor morning recess period on six separate occasions. When two or more children were observed during an individual recess, we purposely selected children who did not typically play together in order to minimize interaction.

Baseline. Baseline consisted of two observations per child (Table 1). For Day 1 baseline, a participant was outfitted with an accelerometer along with two additional classmates not part of the study in order to (a) prevent the assigned teacher from knowing which child was being observed, and to (b) determine a true baseline level of TIP. (The two classmates wore accelerometers for display and no data were recorded.) All three children were free to play with whom and where they wanted with any interaction between them considered incidental. No researcher–teacher interaction took place. For Day 2 baseline, only the participant was equipped with an accelerometer so we could determine a baseline level of TIP when the child was known to the assigned teacher (i.e., Hawthorne effect). We informed the teacher that the child would be observed during recess and that she should act normally.

Intervention. The intervention phase consisted of three observations per child. The supervising teacher wore a BIE device, which allowed her to serve as a conduit between researcher and child by relaying RIP. In this phase instances of both TIP and RIP were recorded.

Withdrawal. A single-observation withdrawal followed the intervention and concluded the study. The BIE was withdrawn and previously described Day 2 baseline conditions were reintroduced.

RIP Creation and Delivery Procedure

Creation. We desired to mitigate role conflict and barriers associated with teachers having to be mindful of a participant's behavior

during an entire recess. Therefore we served as lookouts for sedentary activity and subsequently supplied a prompt (RIP) to be relayed to the affected child. Prior to the intervention, the first and second authors created a RIP menu that detailed specific physical activity prompts tailored to where a child was located and what he or she was doing. These were inductively derived from observations made during a previous study (Nicaise et al., 2012). The final iteration of the prompt menu consisted of 18 specific prompts and two recurring general prompts. Combining the specific and general prompts resulted in a 4-prompt progressive sequence per playground location (e.g., sandbox, playground, grass field). Prompts 2–4 in a sequence could only be given if a child remained in the same location while being observed engaged in additional 1-min sedentary episodes. (See Table 2 for an example of prompt content.)

Table 2
Researcher-Initiated Prompt (RIP) Sequence and Content (Sandbox Example)

Prompt	Content	Specificity	Teacher autonomy
1	Fill as many buckets to the top before I count to 30.	Specific	No
2	Your choice. Say/do anything to get the child to move vigorously.	General	Yes
3	Spell your name with the rake and then erase it by smushing it with your feet.	Specific	No
4	Take child to another area and give him/her an idea for active play.	General	Yes

Delivery. We delivered RIP using T5000/T5500 series Motorola Talkabout two-way radios (Giant International, Atlanta, GA). Prior to the intervention, teachers practiced wearing an earpiece connected to a waist-clipped radio set to the same frequency as a researcher's paired device. The setup freed the teacher from being in proximity of a participant. It allowed us to remain physically unobtrusive and quickly cue the teacher as needed.

Physical Activity Measures

Direct observation. Data collectors used a modified version of the Observational System for Recording Activity in Children–Preschool Version (OSRAC-P) to measure the level (5 categories), type (15 categories), and outdoor educational/play context (10 categories) of physical activity (Brown et al., 2006) and to record the location of the child (five distinct zones) and prompt type[1] (three categories; none, TIP, RIP).

The observers had been trained for a previous study at the same venue and were experienced. Nine booster training sessions were provided prior to data collection. Interobserver agreement checks were performed and resulted in the following interval-by-interval reliabilities: physical activity level >.94**,** physical activity type >.90, outdoor educational context >.90, location >.95. Interobserver agreement for prompts was .93 using the scored-interval method**.**

Observations began when a participating child entered the playground and ended when the child left the area. Ipod 4G/Nano devices (Apple, Cupertino, CA) cued observation/recording intervals (5 s observe/25 s record).

Accelerometry. Children wore an ActiGraph GT3X solid-state triaxial accelerometer (Pensacola, FL) affixed to the waist by elastic belt and positioned on the outside of clothing in line with the right hip. The epoch interval was set at 5 s and the accelerometers were synchronized daily with the chronometers used for observation.

Protocol

An observer was assigned to one participant for an entire recess period. The supervising teacher assigned to a participant was identified prior to observation and only her TIP was recorded on the OSRAC-P data collection form. Per the OSRAC-P protocol (Brown et al., 2006), a child was observed during a 5-s interval followed by a 25-s recording interval. When a participant's physical activity level was coded as 1 (stationary) or 2 (limbs: no trunk movement) for two consecutive intervals (i.e., 1 min), the observer prompted the teacher with a RIP through the BIE.

Data Analysis

We used ActiLife Data Analysis software version 4.3.0 (ActiGraph, Pensacola, FL) and Meterplus software version 4.2 (Santech, Inc., San

Diego, CA) to download and analyze accelerometer data, respectively. We used SPSS version 19.0 (IBM, Armonk, NY) to analyze data.

To identify prevailing contextual variables associated with sedentary behavior prior to delivering RIP, frequency counts of OSRAC-P intervals by physical activity type, educational context, and location were converted into percentages.

Analysis of prompting. To detect a Hawthorne effect for TIP, we split the baseline into Day 1 and Day 2. The prompt rate data were log (x + 1) transformed because prompt rates for baseline Day 1, baseline Day 2, and withdrawal were positively skewed. We then used RM-ANOVA and post hoc Bonferroni contrasts to determine rate differences between individual phases.

We examined changes in TIP as a percentage of observation intervals at the aggregate level. To detect changes in TIP between the baseline ensemble (baseline + withdrawal data) and intervention phases, we used visual analysis and also calculated the Tau-U statistic, its effect size, and its associated 90% confidence interval (Parker, Vannest, Davis, & Sauber, 2011; online calculator [http://singlecaseresearch.org/calculators/tau-u]). Tau-U combines elements of Kendall's rank correlation and Mann–Whitney U tests to reveal the "percent of data that improve over time considering both phase nonoverlap and Phase B trend, after control of Phase A trend" (Parker et al., 2011, p. 291). Its strengths lie in its robustness against autocorrelation, control for baseline monotonic trend, and applicability for even short phases (Parker et al., 2011).

Analysis of whole recess physical activity levels. We analyzed OSRAC-P and accelerometer data for the entire recess period to determine whether physical activity levels differed between baseline ensemble and intervention phases. We calculated mean levels of activity as a percentage of observed recess time for observation and accelerometer data separately. OSRAC-P levels 1 and 2 were combined and categorized as sedentary activity; level 3 was categorized as light activity; and levels 4 and 5 were combined and categorized as MVPA. For accelerometry, 15-s epoch activity count cut points of ≤ 398, 399–614, and ≥ 615 were used to distinguish sedentary activity, light activity, and MVPA, respectively (Sirard, Trost, Pfeiffer, Dowda, & Pate, 2005). We used previously described visual analysis techniques and calculated the Tau-U statistic to detect differences between baseline and intervention phases.

Analysis of physical activity level pre- and post prompt. We analyzed accelerometer activity counts at the prompt level within and between two prompt conditions—baseline Day 2 TIP and intervention RIP—to determine prompting's efficacy to immediately increase physical activity post prompt. Few children were given any prompts during baseline Day 1, so baseline Day 2 was used for analysis. Three children were excluded (i.e., $n = 9$) because they either received no prompts during baseline or received prompts that were too close together chronologically to allow for valid analysis (i.e., nonoverlap of 15-s epochs).

We compared post-prompt physical activity counts over a 90-s span to those of the 60-s span prior to prompting, the latter of which corresponded to the observation stimulus for providing a RIP. The additional 30-s comparison period post prompt accounted for the lag between cueing the teacher and delivery of the prompt to the child.

Results

Descriptive Results

Nine girls and three boys participated ($M_{age} = 4.7 \pm 0.2$ years; BMI percentile = 44.8 ± 27.6) in the study, with a majority being White (Table 1). The eligibility criteria for this study were based on sedentary activity level of same-venue recess from a previous study (Nicaise et al., 2012): over three observations conducted in fall 2010, the mean level of sedentary activity among the children was 73.1 ± 8.3% (Table 1). Table 1 also depicts the multiple baseline, staggered observation schedule across children. Recess length (min) during baseline (21.58 ± 3.08), intervention (20.31 ± 2.82), and withdrawal (22.08 ± 3.82) phases did not differ significantly, $F(1.30, 14.27) = 2.34$, $p = .14$.

What Is the Context Under Which Sustained Sedentary Activity Is Performed (i.e., Necessitating a RIP)?

RIP were given most frequently when children had been observed seated/squatting/kneeling (46.6%) or standing (42.9%); when involved in open space (43.1%), with fixed equipment (22.0%), or in teacher-arranged activity (17.9%); and when located in the grass (37.3%), or on the playground or amphitheater/cement path (29.4%

each). Of the 111 total instances when a RIP was warranted, the teacher successfully transmitted 83 (74.8%; 6.8 ± 2.1 per child over the intervention) with a child compliance rate of 77.1%. Transmission failed in 28 instances (25.2%), either because it was not supplied to (i.e., not wanting to disturb a preoccupied teacher) or not relayed by the teacher (i.e., involved in higher priority events).

What Is the Basal Rate of TIP? How Does This Rate Change When Teachers Are Aware of Being Observed? How Does It Change in the Presence of RIP?

The TIP rate (per 15 min) was virtually zero at baseline Day 1 (Figure 1). At baseline Day 2—when teachers were first made aware of which child was being observed—the TIP rate increased by nearly 18 fold compared to baseline Day 1. Across the intervention, the TIP rate increased by an additional 47.8% compared to baseline Day 2. At withdrawal, the TIP rate decreased by 74.5% compared to the intervention (Figure 1). A statistically significant difference in prompt rate existed between phases, $F(1.85, 20.40) = 18.11$, $p < .001$, $\eta_p^2 = .62$. Post hoc Bonferroni contrasts revealed that the prompt rate was statistically significantly greater at baseline Day 2 than at Day 1 ($p = .01$, $r = .78$), thus indicating the presence of a Hawthorne effect. The intervention prompt rate was statistically significantly greater than at baseline Day 1 ($p < .001$, $r = .98$) and withdrawal ($p = .001$, $r = .85$).

Does Whole Recess Physical Activity Level Change as a Result of TIP/RIP?

Figure 2 visually illustrates level, stability, and trend of sedentary activity, light physical activity, and MVPA for the entire group as measured by accelerometry (top graph) and systematic observation (bottom graph). Based on accelerometry (Figure 2 top), light physical activity and MVPA were low (<25.0%) and were relatively stable within and across phases. Sedentary activity decreased from baseline to intervention (recess 3) and then drifted higher across the remainder of the intervention. Upon withdrawal, sedentary activity was above both baseline and intervention phase levels. Based on observation (Figure 2 bottom), light physical activity and MVPA were higher than accelerometry-measured values and were higher during intervention compared to their respective baseline and withdrawal phases. During the intervention, MVPA was more stable than light

physical activity. Sedentary activity decreased from baseline through intervention (recess 4) and then rose to near intervention recess 3 level. Upon withdrawal, sedentary activity was above all previous values of sedentary activity except for baseline Day 2.

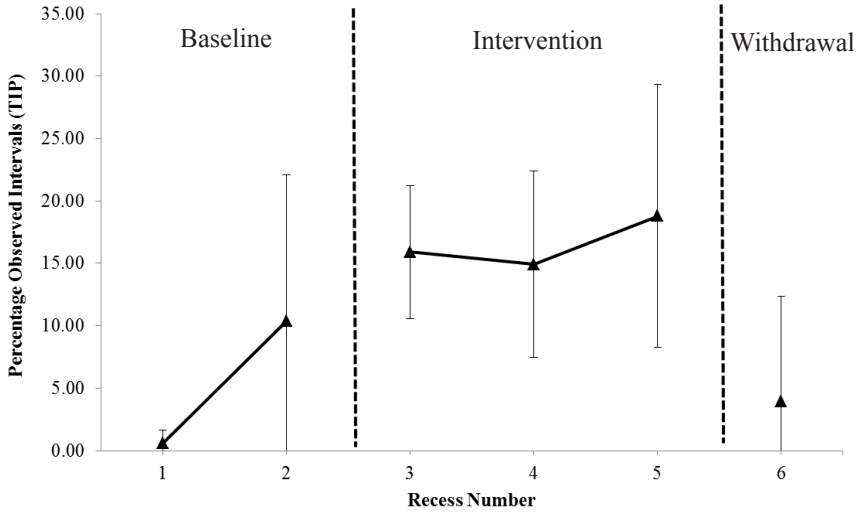

Figure 1. Prompt rate as percentage of observed intervals across phases.

Statistical evaluation of activity level changes at the group level was performed using Tau-*U* (Table 3), which compared levels of physical activity between intervention and ensemble series (i.e., baseline + withdrawal) phases. Parker and Vannest (2009) qualify Tau-*U* score ranges between 0–0.65 as weak or small and between 0.66–0.92 as medium to high. Measured by observation (Table 3), a decrease in sedentary activity demonstrated a medium-to-high effect while increases in light activity and MVPA were weak or small. Measured by accelerometry (Table 3), only MVPA demonstrated an effect and it was weak or small.

Statistical evaluation of effect sizes of activity level at the individual level was also performed using Tau-*U*. Measured by observation, six participants decreased sedentary activity, and four and two participants increased light physical activity and MVPA, respectively. Measured by accelerometry, three participants decreased sedentary activity, and two and three participants increased light physical activity and MVPA, respectively.

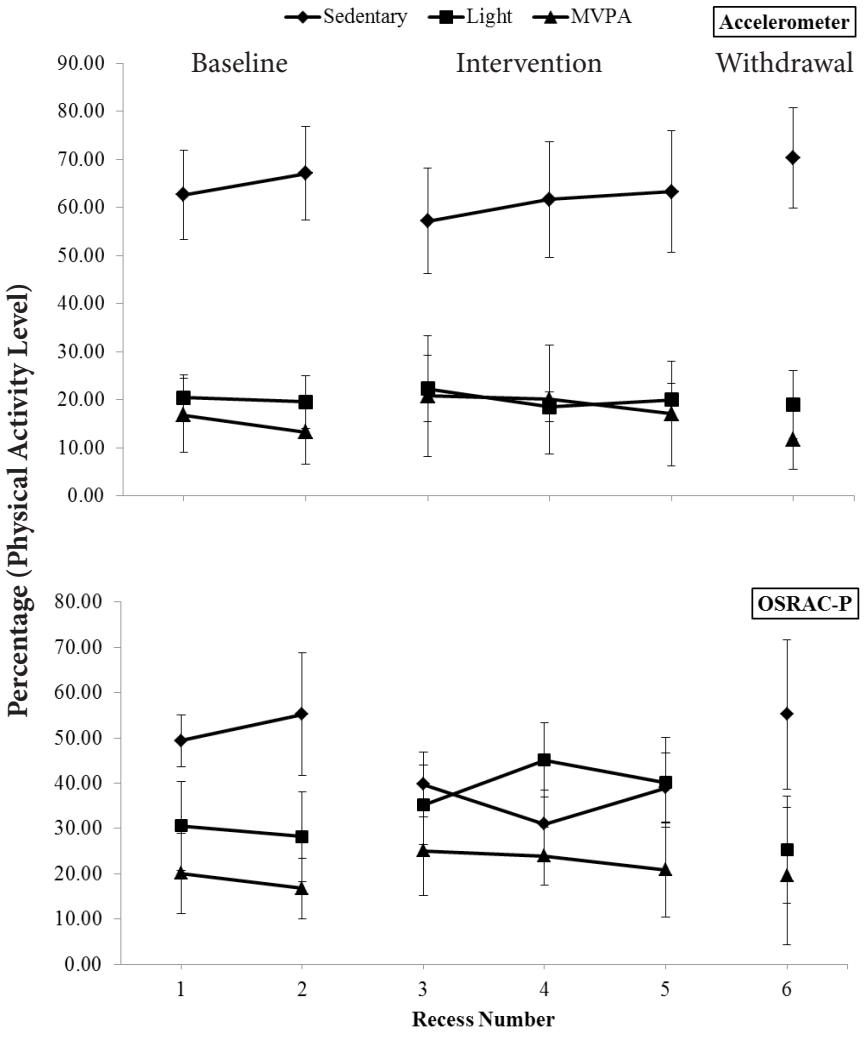

Figure 2. Percentage of sedentary, light, and moderate-to-vigorous physical activity across phases and by measurement type.

Table 3
Weighted Tau-U Effect Sizes (ES) and Confidence Intervals (CI) by Activity Level and Measurement Method for the Entire Recess Period

	Observation		Accelerometer	
Activity level	**ES**	**90% CI**	**ES**	**90% CI**
Sedentary	-0.75***	-0.99, -0.51	-0.19	-0.43, 0.56
Light	0.57***	0.35, 0.78	0.00	-0.24, 0.24
MVPA	0.31*	0.06, 0.55	0.32*	0.07, 0.61

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

Does Physical Activity Level Post Prompt Increase Over Pre-Prompt Level as a Result of TIP/RIP?

Figure 3 visually depicts the level of physical activity prior to and after prompting for TIP (baseline) and RIP conditions. Prior to prompting, average activity counts fell entirely within the sedentary range. Teachers and researchers using intuition and systematic observation instrumentation, respectively, accurately timed their prompts (i.e., when children were indeed sedentary based on accelerometry activity count thresholds).

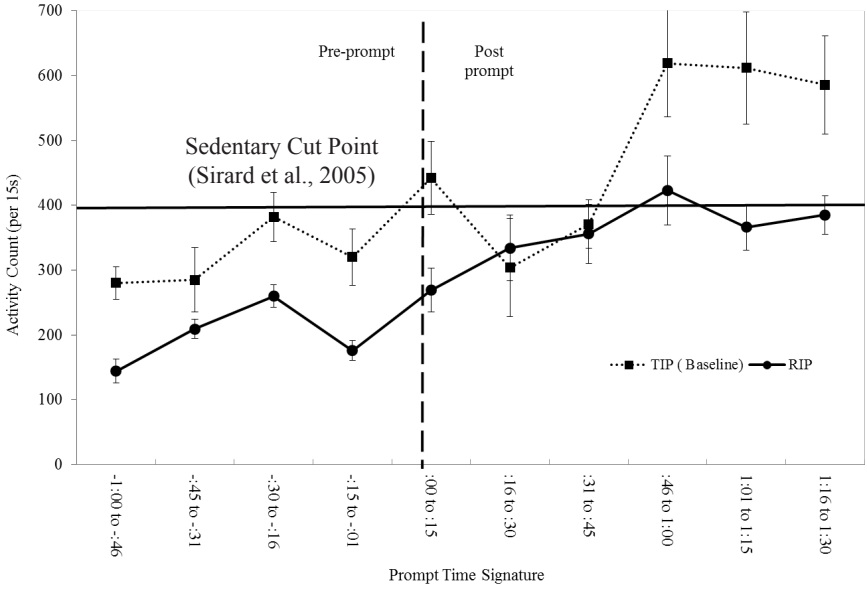

Figure 3. Activity count for 60-s pre- and 90-s post-prompt periods under TIP and RIP prompting conditions.

The level of physical activity under TIP conditions increased sharply between 15-s post prompt epochs 3 and 4, at which time it exceeded and remained above the sedentary cut point (i.e., light activity; Figure 3). Under RIP conditions, the level of physical activity increased for 4 consecutive epochs post prompt finally exceeding the sedentary cut point at post prompt epoch 4 (Figure 3). Activity counts for the final two RIP condition epochs dipped below the sedentary cut point but were higher than those for all post prompt epochs except epoch 4.

Statistical evaluation of effect sizes for changes in the group's activity level pre- and post prompt was performed using Tau-*U*. There was no statistically significant difference in physical activity level pre- and post prompt under TIP conditions (Tau-*U* Effect Size = 0.50, [90% CI = -0.14–1.14]), but there was under RIP conditions (Tau-*U* Effect Size = 0.96 [90% CI = 0.32–1.60]). In other words, children's physical activity level post prompt was significantly higher than their pre-prompt level when researchers—compared to teachers—initiated a prompt.

Discussion

Children spend up to 8 hr daily in childcare with most of the time spent engaged in sedentary behavior (Reilly, 2010). Preschool teachers can play an important role in promoting physical activity during recess and are encouraged to "frequently prompt children to be active" (Trost, Ward, & Senso, 2010, p. 524). Descriptive data, however, indicate that prompting of physical activity is extremely rare (Brown et al., 2006). Similarly, in our study, prompt rate was extremely low at baseline Day 1 (i.e., supervising teacher unaware of the participating child) and only marginally higher at withdrawal. A Hawthorne effect existed as prompt rate dramatically increased at baseline Day 2 (i.e., the participating child first became known to the supervising teacher). This is encouraging as it suggests that when teachers were made aware of participating children, they consciously prompted them without formal intervention. During the intervention the prompt rate rose even further and was significantly higher than at baseline Day 1 and withdrawal. This may be partially due to teacher-initiated follow-up after a RIP in order to reinforce children's responses. Furthermore, compliance to RIP was >75% and compares reasonably well with previous reports (89.5%,

under nonintervention TIP conditions; McKenzie et al., 1997). This is encouraging as children in our study were previously identified in the highest tertile for sedentary activity, yet responded favorably to physical activity prompts. Prompt rates during the intervention increased when the antecedent stimulus of excessive sedentary activity was formally detected by means of systematic observation, thus operant conditioning—the theoretical underpinning of the intervention—was supported. Nonetheless, given the dramatic decrease in TIP at withdrawal, maintaining elevated rates of teacher prompting in the absence of an intervention is unlikely. Thus, formal training of teachers with periodic boosters as well as adoption of a physical activity prompting policy is likely necessary (McKenzie et al., 1997). Furthermore, acknowledging and incentivizing prompting might reinforce teachers for its regular performance.

Scientists can advance the field by developing a simple and affordable motion sensor for preschoolers that directly prompts physical activity when excessive sedentary activity is detected. Such a device should result in teachers having to prompt less frequently or altogether. Toward this end, the Jawbone UP (San Francisco, CA) bracelet is a wrist-worn motion sensor with an idle alert app that triggers the device to vibrate if a person is sedentary for a predetermined interval. Its cost (~ US$130) and operational requirements, however, make it infeasible with young children.

Observed levels of sedentary activity at baseline and withdrawal were slightly lower than those reported elsewhere for preschool recess among similar-age children (56%, Brown, Googe, et al., 2009; ~59%, McKenzie et al., 1997). Interestingly, the sharp decrease in sedentary activity during intervention (below 40% measured by systematic observation) compares favorably to those found among children 2 years younger (~31%, Gubbels et al., 2011).

Accelerometer-measured sedentary activity dropped during the intervention compared to withdrawal, but not compared to baseline Day 1. Baseline Day 1 represented the undisturbed, natural recess setting. While only one observation, the extremely low rate of prompting partially reflects limited teacher–child interaction, which is associated with higher levels of non-sedentary behavior (Brown, Pfeiffer, et al., 2009). These results complement those of a multicomponent intervention that included teacher encouragement of structured dancing and running forms of physical activity that re-

sulted in profound increases in observed MVPA (Brown, Googe, et al., 2009). Prompting alone may prove sufficient to statistically significantly reduce sedentary activity while more elaborate means are necessary to facilitate MVPA. Further, a dose response relationship may exist whereby excessive prompting leads to more, not *less*, sedentary activity. That sedentary activity decreased at all in this study is noteworthy as the participants were specifically selected for their previously high levels of sedentary activity.

Post prompt, it was evident that regardless of prompt condition, physical activity intensity vis-à-vis activity counts only modestly increased: the cut-point threshold for moderate physical activity was not achieved post prompt. No statistical differences between prompt types emerged, which may be related to the extra step in the behavior chain of providing RIP. Specifically, a time lag existed in the RIP condition that did not exist in the TIP condition owing to factors such as teachers comprehending the audio transmission, moving toward the child, assessing the situation, et cetera. Additionally, teachers may not have provided RIP to children with the same level of encouragement/enthusiasm compared to TIP.

Conclusion

To date, formalized prompting interventions that focus on physical activity have not been evaluated in a preschool setting. Results of this study suggest that prompting children—regardless of who initiates it—to be physically active during recess results in temporary increases in physical activity intensity. Prompt menus can be tested and tailored by staff to individual outdoor settings, and equipment and can be modified seasonally. Consistent prompting with enjoyable physical activities/tasks may indirectly lead children to perform suggested activities without adult prompting.

Strengths of the study included (a) involving children who previously demonstrated themselves as sedentary, (b) combining observation and accelerometry to objectively determine the necessity of prompting, (c) measuring the effects of the intervention at the macro and micro levels, (d) employing procedures to measure the presence of a Hawthorne effect, and (e) minimally imposing on teachers' primary supervisory duties. There were several weaknesses as well. The preschool limited the number of observations per child we were allowed to perform, which required us to reduce the length of the base-

line in order to include "three attempts to demonstrate an intervention effect at three different points in time" (Kratochwill et al., 2010, p. 15). The stark absence of prompting, however, on baseline Day 1 helps establish credulity for the ensuing immediate and sustained prompting rates (i.e., TIP/RIP) vis-à-vis the multiple baseline across subjects design. Use of a control group was not possible in this study because we were not allowed to artificially manipulate the routine of class and recess conditions nor did we wish to reduce our sample size in half. In response, we adjusted the observation schedule to create a multiple baseline across subjects design. The sample of 12 children may be considered small—though not by behavior analysis standards—which when coupled with participants representing a single school, may limit generalizability. We encourage replications across age groups as well as with gender-balanced samples whereby any differential effects of prompting on girls and boys could be determined. We intentionally did not train participating teachers in TIP in order to minimize their burden and to maintain a natural environment. We do not know to what degree results may have differed if teachers received training.

Environments that promote physically active behavior must be created with multifocal ones undoubtedly exerting the greatest impact. Yet simple changes such as modifying adult-child interactions can make a difference. Specifically, through verbal prompts, teachers can immediately stimulate children to change their activity level from sedentary toward (i.e., RIP conditions) and above (i.e., TIP conditions) light intensity physical activity. Additionally, the combined impact of RIP and TIP—up to an as-yet determined critical threshold—appeared to decrease sedentary behavior over an entire recess. In other words, from a practical standpoint, in order to promote physical activity in preschool children some prompting is better than none.

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[1]If a RIP was called for and was not able to be given or not followed through an explanatory notation was made on the OSRAC-P recording form (e.g, disciplinary action, injury, mechanical difficulties, etc.).

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PHYSICAL ACTIVITY

The Nature and Incorporation of CSPAP Learning Experiences in Physical Education Teacher Education: Accounts of Faculty From "Highly Effective" Programs

Collin A. Webster, Laura Russ, Liana Webster, Sergio Molina, Heesu Lee, Jason Cribbs

Abstract

The purpose of this study was to examine faculty accounts of the nature and incorporation of Comprehensive School Physical Activity Program (CSPAP) learning experiences for preservice physical education teachers (PPETs) in undergraduate physical education teacher education (PETE). Nine individuals employed as faculty members in different PETE programs were purposively selected to participate, based on a previous study in which the individuals had reported that their programs were "highly effective" in preparing PPETs for multiple CSPAP roles. A semi-structured interview was conducted with each participant to examine the nature of their pro-

Collin A. Webster is an associate professor in the Department of Physical Education and Athletic Training at the University of South Carolina. Laura Russ is a doctoral student in the Department of Physical Education and Athletic Training at the University of South Carolina. Liana Webster is an assistant professor in the Department of Kinesiology at Texas A&M University - Corpus Christi. Sergio Molina is a doctoral student in the Department of Physical Education and Athletic Training at the University of South Carolina. Heesu Lee is a doctoral student in the Department of Physical Education and Athletic Training at the University of South Carolina.Jason Cribbs is a doctoral student in the Department of Physical Education and Athletic Training at the University of South Carolina. Please send author correspondence to websterc@mailbox.sc.edu

grams' CSPAP learning experiences for PPETs and the adjustments, catalysts, challenges, and goals that characterized the program change process to incorporate these experiences. Constant comparison analysis revealed that many of the CSPAP learning experiences were field-based. The adjustments programs made to incorporate CSPAP learning experiences included embedding such experiences into existing coursework or combining/removing existing courses to make room for CSPAP learning experiences. A wide range of catalysts, challenges, and goals pertaining to the program change process were evidenced in data. This study provides a glimpse of how PETE programs have responded to shifts in conceptions about the professional roles and responsibilities of physical education teachers in line with public health concerns.

Until the last decade of the 20th century, contemporary conceptualizations of the physical education teacher's professional role and responsibilities ranged mostly within the relatively narrow sphere of school gymnasia, playing fields, and other instructional settings where physical education lessons are usually taught. In the United States, such conceptualizations are reflected in the national standards for initial teacher certification in physical education (National Association for Sport and Physical Education [NASPE], 2008b), which largely circumscribe the knowledge, skills, and dispositions of an effective physical education teacher to the physical education "classroom." But in the last 25 years, proposals about physical education's role in public health, based on the increased prevalence of obesity concurrent with dropping rates of physical activity (PA), have challenged dominant views in the field and drawn broader boundaries to define the workspace of physical education teachers (Webster et al., 2014). Recent public health-aligned perspectives cast physical education professionals as leaders of Comprehensive School Physical Activity Programs (CSPAP; Carson, Castelli, Beighle, & Erwin, 2014), which encompass multiple programs and contexts in and around a school to maximize the promotion of PA to all members of the school community. The implications of such perspectives ultimately extend to physical education teacher education (PETE), where faculty must critically examine professional standards and consider current program offerings in light of changing societal needs and emerging schools of thought about the purpose and scope

of a physical education teacher's craft (Goc Karp, Scruggs, Brown, & Kelder, 2014).

The present study was undertaken as an extension of a previous investigation in which we asked faculty from PETE programs around the country to rate the effectiveness of their undergraduate programs in preparing preservice teachers for CSPAP roles (Webster et al., 2016). In that study, perceived effectiveness was uniformly high for roles traditionally outlined for physical education, but varied considerably for more novel roles tied to other CSPAP components. What caught our attention was that a small number of respondents rated their programs relatively high in preparation effectiveness across most or all CSPAP roles. We wondered what these programs were doing to prepare preservice teachers for CSPAP roles beyond physical education, how faculty had approached the integration of learning experiences related to these roles into their programs, what lessons were learned throughout the integration process, and what futures faculty envisioned for CSPAP preparation in their programs. We felt that the accounts of faculty who had embarked on the journey to align the preparation of future teachers with public health goals would provide valuable perspective to the cadre of teacher educators in our field, who are caught amid the vicissitudes of an evolving profession.

The CSPAP Model: A Conceptual Framework for Teacher Preparation

The CSPAP model originated as a position statement from NASPE (2008a). It expands and refines the focus on PA promotion through schools that stems from coordinated school health models tracing back to the 1930s (Erwin, Beighle, Carson, & Castelli, 2013). In recent years, major public health organizations, including the Institute of Medicine (IOM, 2013) and the Centers for Disease Control and Prevention (CDC, 2013), aligned their recommendations for school-based PA promotion with the CSPAP framework. CSPAPs are conceptualized as multi-component approaches to PA promotion that work through schools, using evidence-based strategies, to maximize engagement in PA by all members of the school community, including students, school professionals, and parents (Erwin et al., 2013).

A CSPAP consists of five components: (a) quality physical education, (b) PA during the school day, (c) before and after school PA, (d) staff involvement, and (e) family and community engagement. *Quality physical education* is the cornerstone of a CSPAP, and is viewed as uniquely designed to provide instruction in the knowledge, skills, and dispositions to lead a physically active lifestyle, while also offering opportunities for students to engage in moderate-to-vigorous PA. All other CSPAP components are considered behavioral, as opposed to instructional, in focus (IOM, 2013). That is, unlike physical education, their purpose does not encompass teaching skills, knowledge, or dispositions for PA. Instead, their sole function is to increase the amount of daily PA participation among students, school professionals, and parents. *PA during the school day* focuses on increasing students' PA in school programs (e.g., recess) and contexts (e.g., general education classrooms) outside of physical education but during regular school hours. *Before and after school PA* focuses on creating or enhancing programs before school (e.g., walk-to-school programs) and after school (e.g., intramurals) to increase students' PA. *Staff involvement* focuses on strategies school professionals aside from physical education teachers can use to implement to increase students' PA (e.g., classroom teachers integrating PA into academic lessons), as well as on strategies to enhance staff wellness (e.g., providing PA programs for teachers). *Family and community engagement* focuses on providing or enhancing PA opportunities for students and their families within both the home environment and the local community.

A number of scholars and public health authorities envision physical education teachers as central protagonists in CSPAP implementation (Beighle, Erwin, Castelli, & Ernst, 2009; Beighle & Moore, 2012; Carson, 2012; Carson et al., 2014; Castelli & Beighle, 2007; Castelli & Ward, 2012; CDC, 2013; Cipriani, Richardson, & Roberts, 2012; Heidorn & Centeio, 2012; IOM, 2013). Recommendations detail expanded roles for physical education teachers in leading implementation efforts. For example, Castelli and Beighle (2007) recommend that physical education teachers form or join a school wellness committee; develop a PA subcommittee; teach moderately-to-vigorously active physical education lessons; sponsor inservice training for other PE teachers; initiate or enhance school-based PA opportu-

nities beyond physical education (e.g., active recess, classroom PA); and connect with community organizations to increase opportunities for PA. Heidorn and Centeio (2012) emphasize the importance of physical education teachers motivating other school staff to serve as role models by being physically active and supporting program implementation. In all, the recommendations for physical education teachers to lead CSPAP implementation specify professional roles that span all five components of the model.

In tandem with the recommended roles for physical education teachers in CSPAP implementation, a growing literature base offers perspectives on the related knowledge and skills that PETE programs should aim to develop in preservice teachers (Webster et al., 2014). A number of authors recommend adding/modifying course content and field experiences for preservice physical education teachers (PPETs) to increase the focus on various aspects of CSPAP leadership, such as school wide and community-based PA programming, PA advocacy, PA measurement, and program evaluation. For example, McKenzie (2007) recommends modifying course content to integrate ecologic models and environmental engineering principles, broadening the focus of field experiences to incorporate expanded pre-professional training in line with CSPAP roles, and providing opportunities for teacher candidates to engage in PA advocacy, such as lobbying for school-based PA programming. Given these recommendations for PETE and limited research on the preparation of physical education teachers for CSPAP roles, the purpose of this study was to examine the accounts of PETE faculty who had incorporated multiple CSPAP learning experiences into their undergraduate programs. Specifically, the following research questions were asked:

1. What do faculty describe as the nature of their program's CSPAP learning experiences beyond those focused on quality physical education?
2. What adjustments, catalysts, challenges, and goals do faculty identify related to incorporating these CSPAP learning experiences into their programs?

Method

Participants

Participants were nine PETE faculty members, each from a different institution, who were purposively selected from a national sample of 175 survey respondents from a previous study (Webster et al., 2016). As part of the survey, respondents were asked to rate the effectiveness of their undergraduate PETE programs in preparing PPETs for CSPAP roles across all five components of the model. Eighteen faculty members, whose effectiveness ratings placed them in the top 10% of all respondents, were invited to participate in the present study. Nine of these faculty members agreed to participate.

Three of the participants were male and six were female. Based on their survey responses, the mean reported age of the participants was 50.78 (SD = 7.0). Further descriptive information about the participants and their programs is presented in Table 1. Some of these participants consented to be identified while others did not. The decision was made to use number codes in place of the names and institutional affiliations of all participants in this paper. Readers can, however, contact the corresponding author to obtain identifying information for consenting participants.

Instrumentation

An interview guide was developed for the study. Questions were written and organized to align with four components of the CSPAP model, including PA during the school day, PA before and after school, staff involvement, and family and community engagement (CDC, 2013; NASPE, 2008). The interview guide was divided into two sections. Questions in the first section asked participants to describe the learning experiences their program provided for preservice physical education teachers (e.g., "Please describe the learning experiences your program provides to prepare preservice physical education majors to promote PA in before- and/or after-school programs"). The second section of the interview guide focused on changes the participants' programs made, and planned to make, to incorporate CSPAP learning experiences. Questions asked participants to describe any program adjustments (e.g., learning experiences that were added/taken away), as well as challenges faced in

Table 1
Descriptive Information About Participants and Their Programs

Participant	Years of experience in PETE	Academic rank	Academic status	Program responsibilities	Number of full-time program faculty	Number of part-time/ adjunct program faculty	Number of graduate teaching assistants
1	26	Professor	Tenured	A, B, D, F, G, H	2	2	1
2	8	Assistant Professor	Tenure Track	A, C, D, F, G	3	2	0
3	7	Associate Professor	Tenured	A, G, J	7	5	0
4	23	Professor	Tenured	A, C, G, H, J	4	1	0
5	25	Associate Professor	Tenured	A, B, C, D, E, F, G, H, I	5	3	0
6	21	Assistant Professor	Tenure Track	A, B, C, D, F, I	1	0	0
7	13	Associate Professor	Tenured	A, C, G, I	7	12	0
8	30	Professor	Tenured	A, B, C, D, F, I	5	3	0
9	8	Associate Professor	Tenured	B, D, J	4	0	0

Note. A = Direct undergraduate PETE program; B = teach elementary methods class; C = teach secondary methods course; D = teach curriculum course; E = teach kinesiology course; F = teach content/skills course; G = supervise student teachers; H = direct student teaching; I = teach classroom teachers course; J = other.

making these adjustments, factors leading to the decision to make program changes, and any foreseeable changes for the future to improve the program's effectiveness in preparing preservice teachers for CSPAP roles.

Prompts, based on key recommendations for CSPAP (e.g., Carson, 2012; Castelli & Ward, 2012; Cipriani et al., 2012; Hall et al., 2011; Heidorn & Centeio, 2012), followed each question to more deeply probe participants' accounts of how their programs were preparing preservice teachers for specific CSPAP roles. For example, in the first section of the interview guide, prompts for the family and community engagement component asked participants to elaborate on learning experiences designed to prepare PPETs for the following roles: (a) organize PA events for students' families, (b) educate parents about strategies to promote their children's PA outside of school, (c) collaborate with community organizations to increase students' use of community facilities to be physically active outside of school, (d) increase family/community use of school facilities to be physically active, (e) increase the availability of transportation from school to community facilities where students can be physically active, and (f) use politicking skills with district/government officials to advocate for policies to increase students' PA at school.

Procedure

Approval to conduct this study was obtained from the lead author's university ethics committee prior to data collection. As a measure of trustworthiness and quality of rigor, the interview guide was reviewed by three noted CSPAP scholars, all of whom have published research and/or recommendations related to CSPAP. Their feedback suggested no changes were necessary so the initial version was then pilot tested with two PETE faculty members for clarity, readability, and feasibility of implementation. The results of the pilot study indicated the instrument was feasible to implement and would be effective in securing the desired information from study participants. Therefore, no changes were made.

Participants were recruited using an email invitation to participate in a telephone interview. Interviews were scheduled and conducted during June and July 2013. At the start of the interview, participants were read a preamble that reiterated why they were selected for the interview, the purpose of the interview, and the focus

of the questions. Participants were instructed to recommend another person in their program for us to contact for any questions they felt someone else would be better suited to answer. However, none of the participants indicated they were unable to answer any of the questions or recommended that we follow up with another person in their programs. A semi-structured format was followed to conduct the interviews (Patton, 2002). This format involved asking the participants all questions on the interview guide, but allowing for flexibility in the order each question was asked and the extent to which prompts were used, based on participants' responses. The interviews usually took on a conversational tone, which seemed to facilitate participants' comfort and candidness. All interviews were audio recorded and ranged from approximately 30 to 60 min.

Data Analysis and Trustworthiness

The audiotapes of the interviews were transcribed verbatim by five of the researchers, resulting in 78 pages of transcription. Each participant was sent a copy of his/her transcript and asked to verify its accuracy, as well as to request any changes or add detail. This member-checking procedure both refined and expanded the data and helped to ensure the participants had ample opportunity to express their views in response to each interview question (Patton, 2002). The transcripts were then analyzed using constant comparative techniques (Charmaz, 2006; Corbin & Strauss, 1990; Fram, 2013), while remaining sensitive to the CSPAP model and recommendations framing this study. Four of the researchers, all trained in qualitative analysis, used open, axial, and selective coding to draw out themes and distinctions in the types of CSPAP learning experiences programs offered and the program change processes related to the integration of these experiences. First, transcripts were read several times to construct "meaning units," which were excerpts the researchers (a) identified as containing useful information in relation to the research questions and (b) subsequently labelled and summarized. Next, the meaning units were categorized according to the sub-focuses of each research question (i.e., types of learning experiences by CSPAP component and program change processes with respect to adjustments, catalysts, challenges, or goals). The units in each category were then placed into subcategories consistent with the focus of the interview probes. For example, in the category for

family and community engagement, meaning units for learning experiences related to educating parents about strategies to promote their children's PA outside of school were grouped together as a subcategory. Finally, the units in all subcategories were compared within and between each category, first for each transcript separately, and then across all transcripts, to identify both common and unique aspects of CSPAP integration in the nine programs.

At the start of data analysis, the researchers analyzed one of the interview transcripts together to ensure each researcher would follow the same analysis procedures. The researchers then independently analysed subsets of the transcripts. During this stage of the analysis, the researchers crosschecked each other's analyses, identified any differences in interpretation/perspective, and reached consensus through discussion. The findings were sent to each participant as an additional form of member checking (Lincoln & Guba, 1985; Patton, 2002). Each participant was asked to confirm whether the meaning units accurately represented his/her perspectives. None of the participants indicated any changes were needed.

Findings

Overall, three themes were identified through data analysis. One theme was uncovered for the nature of the CSPAP learning experiences programs offered. This theme was labelled "Field Experiences." The other two themes were for program adjustments that were described as part of the change process for incorporating CSPAP learning experiences. These themes were labelled "Embedding CSPAP Learning Experiences" and "Making Room for CSPAP Learning Experiences."

The Nature of the CSPAP Learning Experiences

Field-based learning experiences. The one common thread in the nature of the CSPAP learning experiences participants described was that the experiences were usually based in field settings (i.e., beyond the university classroom). Field experiences often consisted of special CSPAP events for students, staff, and/or families. For example, some of the learning experiences for family and community engagement included assisting at a family fun night at school; attending parent meetings; organizing a district-wide pedometer challenge for school staff; and calling state legislators to try to prevent the passage

of a bill that would allow some students to qualify for a waiver for taking middle school physical education. In other cases, field placements were structured as part of an ongoing learning experience. For instance, as part of a course on community and environmental health, one of the programs required PPETs to do a 15-hr placement outside of the school system (e.g., at a local senior center) to develop exercise programs for adults.

Many of the field experiences for CSPAP focused on staff involvement. These experiences often served a dual purpose in line with CSPAP recommendations. Specifically, these experiences helped PPETs learn about promoting staff wellness, as well as about increasing staff involvement in PA promotion. For instance, some of the participants discussed organizing incentive programs not only as as a strategy to increase the PA of school employees, but also as a strategy to motivate these staff to be active role models for their students. Field experiences targeting staff involvement typically focused on increasing the involvement of classroom teachers in school-based PA promotion. Some examples included having PPETs present workshops to inservice classroom teachers and having PPETs present brain breaks and cross-curricular activities to help classroom teachers learn to increase PA in their classrooms. One participant described a field-based experience in which PPETs worked with classroom teachers using a treadmill program:

> One thing we've done with elementary—and our kids actually do this in our teaching exceptional children class—we have a treadmill program we do at the elementary schools where we have, I think, three treadmills at both elementary schools and our kids basically take the students identified by the district as maybe needing some focus time and we get them on the treadmill program. The kids are only on the treadmill anywhere from 8–15 minutes doing different walking and hand-eye coordination things. And then they go back to the classroom, and the classroom teachers are amazed at how much more focused these kids are, how much more relaxed. (Participant 7)

The same participant stressed the importance of learning experiences focused on increasing staff involvement in the following way:

> It's a good eye-opener for [our majors]. They always think that everybody knows what they know, and then they're talking to staff and they're like, 'They don't really know what's good for them,' and we're like, 'No, you're the expert, you're training to be the expert and they need your leadership.' (Participant 7)

Adjustments, Catalysts, Challenges, and Goals Related to CSPAP Preparation

Adjustments: Embedding CSPAP learning experiences. Across the nine programs, CSPAP learning experiences beyond quality physical education were often embedded in courses and other learning experiences that were already part of the program of study. For example, programs incorporated learning experiences for promoting PA before and after school in a range of courses with a focus on methods of teaching; adapted physical education; organization and administration; sports, camps, intramurals, and coaching; community and environmental health; and lifetime physical activities. PPETs also learned about promoting staff involvement in their existing coursework. Courses that were mentioned included those focusing on human wellness and lifetime fitness; community and environmental health; legal aspects and general safety; and measurement and evaluation. Several of the programs embedded learning experiences related to staff involvement within student teaching by assessing PPETs on communication with administrators during student teaching, having PPETs create newsletters for administrators, having PPETs serve on school wellness committees, and conducting mock advocacy experiences with PPETs.

Other examples of embedded learning experiences were evident in preparing PPETs for roles related to family and community engagement. As part of existing courses in the program, PPETs created active homework assignments, wrote and sent newsletters to parents, and included a "take away" component in physical education lesson plans to help students bring PA to their homes. Newsletters were the most common strategies described by the participants. Below is an example of how one program integrated newsletters into coursework for PPETs:

> The students take a course in education technology and [help] the physical education teachers, who are required to send home newsletters…to put in tips for getting their children more active after school, games they can play that are outside of video games and watching television. (Participant 3)

Making room for CSPAP learning experiences. Integrating CSPAP learning experiences into existing coursework was not always possible or sufficient for programs to provide PPETs with desired knowledge and skills for PA promotion. Therefore, a common type of adjustment was to either combine or remove existing courses to make room for new CSPAP learning experiences. Combinations usually occurred with skills/content courses. For example, one of the participants stated, "We went from a bunch of one credit courses, whether it be basketball, volleyball, to a team sports block" (Participant 7), while another participant stated, "We have two courses now that are called 'Individual and Dual Sports' and 'Team Sports.' It used to be that we had multiple courses like 'Handball' and 'Racquet Ball' and 'Table Tennis' and 'Shuffleboard' and things of that nature. So we sort of collapsed those into two courses so we could concentrate on making the PA a school wide initiative" (Participant 3). Some programs removed courses in the sciences and general education to make more room for CSPAP learning experiences, as illustrated in the following quote:

> We went from having two anatomy and physiology courses to one, so we eliminated a science lab. We eliminated some of the stuff from general education curriculum that they were having to do, and now they can spend more time in their major. (Participant 8)

Examples of other program adjustments included adding courses and moving to dual licensure (physical education and health). One of the participants described adding the "Healthy Active Lifestyle Core," which resulted in seven credits of new coursework relevant to CSPAPs.

Catalysts, challenges, and goals. There was a wide range of catalysts, challenges, and goals related to preparing PPETs for CSPAP

roles, with no strong themes identified across programs. Examples of catalysts included a desire to foster interdisciplinary collaboration across university programs; increased awareness and concern related to local and state-level data on obesity and fitness; the introduction of a state mandate for comprehensive school PA; a growing interest of school administrators, or change in state policy, to hire physical education teachers with dual certification in physical education and health, or who can promote PA beyond physical education class; and, based on research showing a decline in school physical education programs, a heightened concern that physical education teachers cannot make a big enough impact on kids or public health by confining their work solely within the physical education classroom. As illustrated in the following quote, a couple of programs also identified changes in the curricular structure at the college or university level as a factor that allowed for more program flexibility and the decision to integrate more CSPAP learning experiences:

> I'm on a core curriculum committee for the entire college, and we did refine it. We removed 12 hours from the core because we realized as an institution that we could do much more in depth than if we were trying to meet the breadth of learning that we were trying to meet. We have a religion requirement, which is four classes of religion, and then we have an English and literature requirement also that is an additional six classes. We refined those things, which aren't necessarily related to our majors. But just taking those hours out allowed some of the majors to develop more courses in their curriculums. (Participant 4)

Examples of challenges to integrating CSPAP learning experiences into PETE programs included a slow-moving and, sometimes, stagnant university bureaucracy; opposing views of CSPAP integration among department faculty; getting PPETs to expand their sense of professional responsibility to include school wide and community PA promotion; making program changes while simultaneously trying to keep pace with rapid program growth; balancing more than one program focus (i.e., physical education and health promotion); finding curriculum space and/or tying CSPAP content into existing content; getting secondary teachers in schools to "buy in" to CSPAP

ideas and initiatives; and coordinating off-campus field experiences related to CSPAP. The quote below describes one program's experience in trying to invoke change within the university system:

> To change your curriculum at the university, it seems to be a very long and somewhat red-tape process. But we've gotten good at it—how many readings, what we have to have ready for committees—and we give them not only the course history but we give them statistics on schools, stats from the CDC on obesity…We have to be the change. (Participant 7)

In the following quote, some of the issues underpinning opposing views among department faculty are described:

> I think the biggest challenge has been getting the approval and getting the commitment from the department to be enhancing healthy active lifestyles. I think just having everybody across the programs agree that this is the direction we're going because it permeates everything… so if our students go to exercise physiology they're getting more of that kind of perspective as opposed to just 'this is exercise physiology.' And, then, the other piece of it is, a lot of these activities are not really activities that are rewarded by the tenure and promotion system…I mean, they don't often lead to research. They're mostly outreach and engagement oriented things, and so, luckily everyone in our program's tenured, so, but I can imagine for somebody whose not tenured, um, this is a lot of work, and it's work that's usually not rewarded or respected. (Participant 1)

Examples of program goals included developing/using statewide or national PA programs designed specifically for secondary schools, doing more to strengthen and formalize school-university partnerships, incorporating a capstone project that focuses on promoting PA beyond physical education, increasing the focus on politics and advocacy for physical education/PA, extending CSPAP learning experiences to encompass the birth to 5-year-old population, and formalizing cohorts within the major at an earlier point in the program (depicted in the following quote):

> We need to do a better job of getting students into a cohort as quickly as possible. When you have a big community school like we do, you have students taking classes at different times. They transfer in and they're like a junior, so they don't get an opportunity to go through the whole experience. So, I think that's something we need to better streamline, so that we have groups of students who are having the same experience at the same time. I think it makes a stronger bond for the types of experiences that we want students in these programs to have. (Participant 9)

Discussion

This study explored faculty accounts of the nature and incorporation of CSPAP learning experiences in their undergraduate PETE programs, given increased attention to whole of school approaches to PA promotion (CDC, 2013; IOM, 2013). The alignment of physical education with public health goals has implications for the preparation of physical education specialists (e.g., Bulger & Housner, 2009; McKenzie, 2007) and, more broadly, for the way the physical education field situates itself amid school communities (McKenzie & Lounsbery, 2013). The faculty who participated in this study may represent a group of pioneers in PETE, whose accounts of CSPAP learning experiences for PPETs can help other teacher educators foresee possible futures for their own programs and better understand some of the factors involved with the program change process.

The accounts of CSPAP learning experiences described for the nine programs in this study demonstrate that field experiences can be a predominant part of CSPAP preparation for PPETs. Field experiences are recommended for preservice preparation specific to school PA programming (Webster et al., 2015) and more generally in the teacher education literature (McIntyre, Byrd, & Fox, 1996; Zeichner, 2010). Existing partnerships with schools, school districts, and community organizations can be utilized in mutually beneficial ways through PA promotion initiatives beyond quality physical education. Based on the findings from this study, field experiences can be structured around special events or longer term engagements and can facilitate PPETs' education related to multiple CSPAP components.

The program change process can be difficult for PETE faculty. The findings give reason to expect that many traditional PETE courses (e.g., methods, organization and administration) can provide logical platforms for incorporating CSPAP learning experiences. Participants described embedding such experiences into existing coursework. We suspect that program faculty seeking to incorporate CSPAP learning experiences into PETE may view this strategy more favorably than combining or removing existing courses to accommodate CSPAP preparation, especially given the lack of focus on CSPAP preparation in the current standards for initial certification in physical education (NASPE, 2008b).

The results of this study indicate that factors at all levels of the university can thwart program changes related to incorporating CSPAP learning experiences. It is important for faculty seeking change to initialize the change process by presenting a strong rationale to department colleagues so that the department can then stand in unison to advance a proposal to committees at higher levels of the university. The rationale for CSPAP preparation may stem from numerous sources, including research (e.g., childhood obesity), policy (state legislation for CSPAPs), and professional practices (e.g., hiring trends of school administrators). Helping other faculty to identify and build connections between their existing courses and CSPAP may strengthen department unity. Those leading change efforts should be prepared for, and well versed in, university policies and procedures for making official program changes.

The findings further indicate that local schools might also hamper PETE change efforts aligned with CSPAP at the secondary level. Coaching responsibilities of middle and high school physical education teachers, and school policies that restrict facility use to athletics, may limit the number of collaborative opportunities, and amount of time and space available for CSPAP initiatives, especially within the PA before and after school component. While suggestions for gaining the support of secondary schools were not mentioned, a possible strategy might be to provide school stakeholders with educational opportunities about CSPAP. For example, PPETs could give a presentation about CSPAP at a school staff meeting or at an open house night for parents. Educating stakeholders about CSPAP might inspire some in the school community to champion additional PA promotion initiatives (Castelli, Centeio, & Nicksic, 2013).

The faculty members who participated in this study were astutely aware of contextual changes beyond their PETE programs and recognized that these changes necessitated extending and reframing PETE learning experiences using the CSPAP model. While different programs identified and responded to different catalysts for program change, and experienced diverse challenges initiating the change process, all programs embarked on a journey of adaptation and generated new opportunities for PPETs to develop the knowledge and skills necessary for CSPAP implementation. Further, all of the participants articulated clear and specific ideas for continued integration of CSPAP learning experiences into their PETE programs. It was evident that each program represented in this study embraced shifting tides of thought about the purpose and scope of a physical education teacher's work, and was committed to forging new paths between physical education and public health.

This study has two important limitations. First, details about the PETE programs in this study are limited to the subjective accounts of the faculty who were interviewed. Future research examining the integration of CSPAP learning experiences into PETE programs might consider triangulating interviews with multiple faculty representatives and PPETs from each program to investigate the accounts, perspectives, reflections, and insights of other important stakeholders. In addition, studies incorporating objective data (e.g., observations of classroom lessons and field experiences) and program-related documents (e.g., course syllabi and programs of study) are needed to build the descriptive research base in this line of inquiry. Second, it must be acknowledged that while the nine programs represented in this study apparently provided multiple opportunities for PPETs to learn CSPAP roles, there may be other PETE programs that provide similar or different CSPAP learning opportunities that also deserve attention. As mentioned earlier, the study sample was based on information provided by 175 faculty members who responded to a nationally disseminated survey in a previous study (Webster et al., 2016). Although each survey participant represented a different program, there were faculty from many more programs who did not respond.

Conclusion

Faculty from nine programs provided a glimpse of the nature of CSPAP learning experiences and the process of incorporating such experiences in PETE. While the results of this study are preliminary, encouragement can be found, and lessons learned, from those who may already be aligning PETE with CSPAP recommendations. The programs highlighted in this study were diverse in terms of the reported number of full- and part-time faculty for each program. One program only had one full-time member and one part-time member. To the authors, this suggests that incorporating CSPAP learning experiences into PETE is more an issue of program philosophy and vision than of program capacity.

The CSPAP model offered a useful conceptual framework for identifying key areas of focus for preservice preparation that are consistent with evolving notions of the knowledge and skills needed for a career in physical education. We recommend the application of the CSPAP model in future studies aimed at identifying and examining PETE programs that are responding to calls for physical education to play a key part in whole-of-school approaches to PA promotion. Such application can help to elucidate and organize the public health-aligned learning experiences programs incorporate, and ultimately inform the evidence base needed to best prepare future teachers for newly emerging professional roles and responsibilities.

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YOUTH SPORT

Marketing Effectiveness of the Nanjing Youth Olympic Games: Implications for Physical Activity

Lawrence W. Judge, Don Lee, Donald L. Hoover, Jeffrey C. Petersen, David M. Bellar, Sarah Deitz, Brianna Leitzelar, Kara Holtzclaw

Abstract

Despite a successful inaugural hosting of the Summer YOG in Singapore 2010 and the Winter YOG in Innsbruck (2012), prior research shows many individuals worldwide still lack awareness of this event, especially in the target markets of youth, adolescents, and young adults. This study sought to determine the level of awareness of the YOG, in comparison to other international sport festivals in the young adult market, among a group of Kinesiology students. A 24-item survey was developed based on prior YOG research surveys with the addition of comparative questions related to the 2012 London Olympic Games (LOG) and the 2014 Sochi Winter Olympic Games (WOG), including event logo identification. Marketing effectiveness for the YOG was examined by analyzing the perceptions and awareness of the

Lawrence W. Judge is a professor and associate chair in the School of Kinesiology at Ball State University. Don Lee is an assistant professor of Sport & Fitness Administration in the department of Health and Human Performance at the University of Houston. Donald L. Hoover is an associate professor in the Department of Physical Therapy at Western Kentucky University. Jeffrey C. Petersen is an associate professor in the Department of Health, Human Performance, and Recreation at Baylor University. David M. Bellar is an assistant professor in the School of Kinesiology at the University of Louisiana at Lafayette. Sarah Deitz is a student assistant in the School of Kinesiology at Ball State University. Brianna Leitzelar is a graduate assistant in in the School of Kinesiology at Ball State University. Kara Holtzclaw is a graduate assistant in the School of Kinesiology at Ball State University. Please send correspondence to lwjudge@bsu.edu

YOG, WOG, and LOG from a sample of Midwest university sport and exercise science students (n = 286, M_{age} = 19.8, SD = 3.24 years, 58% male and 42% female). These Kinesiology students were surveyed during the period corresponding to the 2014 Nanjing YOG. Primary research questions focused on personal awareness (M = 2.07, SD = 1.42) and public awareness (M = 2.14, SD = 1.12) of the 2014 YOG, 2014 WOG (logo recognition: M = 3.31, SD = 1.78) and 2012 LOG (logo recognition: M = 3.41, SD = 0.86) through Likert-type scaling from not aware (1), to totally aware (7). Secondary research questions focused on likeliness to attend YOG events in Nanjing, China (M = 1.37, SD = 0.91), to watch YOG events on television (M = 2.51, SD = 1.66), and to follow YOG events on social media (M = 2.19, SD = 1.48). Despite the fact that the YOG was in progress when this survey was administered, students' awareness and willingness to engage in the events was extremely low, indicating a need for event organizers to focus on more successful and effective marketing to the targeted audience of youth and young adults.

The Olympic Games have continued to evolve and mature over the years, as the number of individual and team events, countries represented, and participants grows. The modern Olympic Games were founded in 1894 by French historian Pierre de Coubertin, who was dedicated to the promotion of physical education (Wallechinsky, 1992). The inaugural Games were first held in 1896 in Athens, Greece, with fewer than 250 athletes from 14 countries competing in the 42 events (Wallechinsky, 1992). Few major changes have been made to the overall event structure of the Olympics. However, new sporting events, participating countries, and competitors are added with each successive Games. The Winter Olympic Games were added in 1924 in an effort to promote additional events and expand the geographical reach of the Games. That same year the Games became a truly international competition with 3,000 athletes from over 44 countries competing in Paris (Wallechinsky, 1992). By the time the Olympic Games returned to Athens, in Summer 2004, there were nearly 11,000 athletes competing from 201 countries (IOC, 2013). The worldwide exposure of both the Summer and Winter Olympic Games has increased dramatically due primarily to advances in media coverage and technology.

The Olympic Charter, updated by the International Olympic Committee (IOC) in 2013, details seven fundamental principles of Olympism, including the blending of sport with culture and educational goals. As the Rio (2016) Summer Games approach, the spread of the IOC mission, in combination with the increase in individual and country participation, creates an opportunity to partner the modern Olympic Games with physical education programs around the world. These physical education programs aid to equip youth with healthy physical activity (PA) habits that perpetuate into adulthood.

Establishing healthy PA habits is an important public health aim in nearly every country across the globe, fostered internationally through organizations such as the World Health Organization (WHO). Nonetheless, in the past 30 years, childhood obesity has more than doubled worldwide, and sedentary lifestyles are increasingly common. As the Olympic Games make their debut in South America, the following studies are interesting to note. Silva et al. (2009) found a prevalence of 83.1% sedentary adolescents in the Brazilian population, and similar investigations have observed variations from 39% to 93.5% of Brazilian school children engaging in sedentary activities (Silva et al., 2005, Tassitano et al., 2007). Lack of PA is one of many factors linked to obesity that can lead to serious health risks such as cardiovascular disease and chronic kidney disease (Cowie, 2014; Gunta & Mak, 2013). In fact, much of the world today is facing childhood deaths due to children being overweight, rather than underweight. Health complications due to being underweight were the concern decades ago and this switch indicates a need to address this issue. Contemporary children's activities such as video games and television are more sedentary in nature than activities widely performed by previous generations, which creates a lack of PA and contributes to the drastic rise in childhood obesity rates experienced globally (Cowie, 2014).

Additionally, some children and adolescents aren't motivated to engage in regular PA or play sports if they don't enjoy them or don't see value in participating, particular after they reach high school age (Landolfi, 2014). Possessing poor exercise habits in adolescence usually perpetuates as children mature, making the onset of obesity increasingly likely in adulthood (Biro & Wien, 2010). Obesity can lead

to many health-related issues for adults, both physically and mentally. For example, according to a study done by Merten, Wickrama, and Williams (2008), obese adults are more likely to have depressive symptoms than individuals at a normal body weight.

Conversely, children that regularly engage in PA through sporting activities have demonstrated advantages in many situations, including learning complex skills, precision of gross and fine motor activities, reading and writing, and other simple daily tasks (Vieira et al., 2009). Greater widespread understanding of the importance of regular PA upon quality of life for all population segments across the lifespan has prompted innumerable studies to investigate the level of PA in global populations, while also measuring cognitive performance, physical fitness, cardiovascular, respiratory and neuromuscular efficiency (Rezende, Fernandes, & Silva, 2007). To illustrate, Koutedakis and Bouziotas (2003) reported an association between low physical fitness and school performance, and Mikkelsson et al. (2006) concluded that low physical fitness in adolescence has a subsequent negative impact upon adult life.

In an effort to combat rising rates of obesity and inactivity in children and adolescents worldwide and to provide a unique and powerful introduction to Olympism, the International Olympic Committee (IOC) developed the concept of the Youth Olympic Games (YOG; IOC, 2014). The Youth Olympic Games were created on the initiative of the former President of the International Olympic Committee (IOC), Jacques Rogge (IOC, 2014). The IOC Executive Board unanimously approved the president's idea on April 25, 2007. The 119th IOC Session later approved the project in Guatemala City, and the YOG were finally able to take shape (IOC, 2014). Modeled after the Olympic Games, competition is offered in 36 sporting categories over a 13-day festival among youth aged 14 to 18. Participants are eligible to compete if they meet age, eligibility, and citizenship requirements. The relevant athletic associations, in close collaboration with the IOC, determine the final sport competition standards (an age-range criterion varies by sport). Athletes must also comply with the provisions of the Olympic Charter and go through the relevant qualifying event structure in their respective sport. The inaugural YOG was hosted by Singapore in the summer of 2010. The YOG were developed not only to encourage sports participation in youth and

adolescents, but also to increase awareness in the young people of the world about the Olympic Games and their ideals (YOG Visions and Principles, 2014). Through this event, the IOC also hoped to use the YOG as an impetus to increase PA in children and adolescents by focusing on the principles of Olympism and living a healthy lifestyle through sport, ultimately contributing to a healthier world population.

Despite a successful inaugural hosting of the 2012 Summer YOG in Singapore and the 2012 Winter YOG that followed in Innsbruck, research shows many individuals worldwide lack awareness of these events, especially in the target markets of youth and young adults. Although IOC Executives Rogge and Miang explicitly outlined an intent to generate high level of awareness through various media, research notes lower sponsorship and media presence (Hanstad, Parent, & Kristiansen, 2013), as well as low levels of event awareness among American youth sport coaches, figure skating coaches, Greek athletes/coaches, Korean athletes/ coaches, and international physical education and sport practitioners in particular (Judge et al., 2011; Judge et al., 2013; Judge et al., 2012; Judge et al., 2014; Judge, Petersen, & Lydum, 2009). Hanstad et al. (2013) documented a lower presence of media and sponsorship at the 2012 YOG than is typical of the OG, concluding that the YOG may stick closer to the sportsmanship ideal that is part of the Olympic Ideals. Given the multiple avenues for promotion of the YOG in a digital age (e.g. social media, traditional print media, and televised programming) the limited awareness worldwide as well as the slow rate of promotion and adoption of the Games by physical educators, coaches, and other movement professionals, improving event awareness must be addressed if the YOG are to realize any of the aims set forth by IOC officials. As a means of gauging awareness of the YOG among university students enrolled in curricula leading to careers as physical educators, coaches, and other movement professionals, this study sought to determine the level of awareness of the 2014 YOG in comparison to three other international sport festivals: the 2012 London Olympic Games (LOG), the 2014 Sochi Winter Olympic Games (WOG), and the 2016 Rio Summer Olympic Games (ROG) in the young adult target market population. More specifically, this study investigated a sample of Kinesiology students enrolled in a Midwestern university

located within the United States. Students were surveyed during a period coinciding with the Nanjing 2014 YOG. By studying awareness of the games within this specific population and time, the research objective was to (1) gain insight into the effectiveness of the marketing strategy employed for the YOG in comparison to other IOC-sponsored events and (2) gain insight among university students who, based on their chosen field of study, have a vested professional interest in the topics of regular PA and the health of the global population.

Method

Subjects

This study examined marketing effectiveness for the YOG by analyzing the perceptions and awareness of the YOG, WOG, LOG, and ROG from a sample of 286 kinesiology students at a Midwestern university located in the United States. The median age of survey participants was 19.83 years, with a range of 18 to 58 years of age (*SD* = 3.24 years). The sample was fairly balanced from the perspective of gender, with 58% of the survey population male and 42% female. Survey data was collected during the time period of the 2014 Nanjing YOG in order to maximize the potential media exposure of the event.

Sampling and Procedure

A 37-item survey instrument was developed based upon prior YOG research surveys (Judge et al., 2009) with the addition of scaled questions related to intention to attend, view, or follow the 2014 YOG and 2016 ROG, as well as previous exposure to the LOG and WOG via attendance, television viewing, or following through various forms of media. Event logo identification for all three events was also compared in the study. To verify content and face validity, a panel of experts in the area of youth sport reviewed the instrument prior to the start of the study. The demographic components included gender, coaching experience, sport administration/management

experience, and athletic background. A 7-point Likert-scale method was used for ranking the dependent variables of the study, including perceived personal awareness of the YOG, perceived public awareness of the YOG, intention of YOG event attendance, and intention to view the YOG on television. Questions were added to measure the social networking habits and behaviors of the participants. The final component was multiple-choice elements requiring the recognition of the correct logo of the YOG, ROG, WOG, and LOG from a selection of five similar graphic designs. Both the survey and the research protocol were reviewed and approved by the appropriate university institutional review board (IRB).

Data Analysis

Descriptive and analytical statistics were calculated for the overall variables using SPSS version 21.0. Multiple regression analysis was applied to examine the extent to which independent variables (i.e., public awareness and event familiarity) had a statistically significant impact on dependent variables (i.e., game attendance, watching televised games, followership of social media related with YOG, and so on). Prior to the main analyses, data normality assumption was checked via skewness and kurtosis values.

Results

Assumption Check

Prior to the main data analyses, data normality was checked and verified. Both skewness and kurtosis values remained within the suggested criteria of 3.0 or two standard deviations (Hair, Black, Babin, & Anderson, 2010), and these results confirmed data normality.

Demographic Statistics

Most respondents had some sort of athletic background (88.1%). Approximately three quarters of the participants played sports in their youth (74.5%), and a small amount of participants were parents of youth athletes (6.3%).

Table 1
Demographic Profile

Variables	Data
Gender	Male = 166 (58%), Female = 120 (42%)
Athletic background	Recreational athlete = 87 (30.4%)
	Current/former competitive athlete = 200 (69.9%)
	No athletic background = 34 (11.9%)
Youth sport participant	Yes = 213 (74.5%), No = 71 (24.8%)
Parent of youth athlete	No = 259 (93.5%), Yes = 18 (6.5%)

Descriptive Statistics

Primary research questions focused on personal awareness (M = 2.07, SD = 1.43) and public awareness (M = 2.15, SD = 1.16) of the YOG in general, 2012 LOG personal awareness (36% of the respondents), 2014 Sochi WOG event logo recognition (15% of the respondents), and 2016 ROG logo recognition (60% of the respondents) through Likert-type scaling from *not aware* (1), to *totally aware* (7). Secondary research questions focused on likeliness to attend 2014 YOG events in Nanjing, China (M = 1.37, SD = 0.91), to watch televised Nanjing YOG (M = 2.51, SD = 1.66), and to follow Nanjing YOG on social media (M = 2.19, SD = 1.48). Reviews of the overall descriptive statistics for the respondent's past and current involvement with YOG (2010 Singapore YOG, 2012 Innsbruck YOG, and 2014 Nanjing YOG) indicated virtually no improvements in Olympic Game consumption (game consumption percentages ranged 0%–2%, at best, between these three events).

Table 2
Descriptive Statistics

Variables	*N*	*M*	*SD*	Skewness	Kurtosis
Familiarity with YOG in general	286	2.07	1.426	1.395	1.403
Public awareness on YOG in general	286	2.15	1.175	1.032	1.404
Familiarity with OG in general	286	5.61	1.657	-1.192	.697
Public awareness on OG in general	286	5.25	1.780	-1.075	.349
Logo recognition of 2012 OG	274	3.41	0.860	-.468	.273
Logo recognition of 2014 WOG	273	2.44	1.379	.529	-.966
Logo recognition with 2014 YOG	254	3.31	1.783	-.281	-1.762
Attendance intention to 2014 YOG	286	1.36	.914	2.768	7.453
TV watching intention to 2014 YOG	286	2.51	1.669	.942	.050
Social media intention to 2014 YOG	286	2.17	1.474	1.138	.363

Main Results

A sizeable segment of the respondents indicated that they usually attend sporting events in person an average of 11–20 times per year (34.3%) or 21–30 times per year (24.5%). Nearly 40% (39.5%) of the respondents watched live sporting events on television more than 50 times per year. Respondents also regularly viewed sports-related websites (34.4%), social media (31.5%), newspapers (48.3%), or magazines (43.4%). Respondents closely followed two to four different sports (66.5%) or three to four individual athletes in the media (25.6%).

Regression Analyses

Multiple regressions were run to see to what extent both personal familiarity with YOG and public awareness impacted dependent variables: (1) intention to attend 2014 Nanjing YOG, (2) watch televised 2014 Nanjing YOG, and (3) follow 2014 Nanjing YOG via social media. To minimize Type I error, alpha level was adjusted from

.05 to .017, based on Hair et al.'s (2010) recommendations. Several significant results were found. First, all three regression models were statistically significant (α = .007, .000, and .000, respectfully) but they provided varying results at the univariate level. More specifically, the first regression on game attendance for 2014 Nanjing YOG indicated that neither personal familiarity with YOG (α = .097) nor public awareness (α = .263) significantly predicted this dependent variable, explaining a mere 3% of the variance (R^2= .034). In the second regression, however, personal familiarity with YOG (α = .001) had statistically significant impact on the respondents' viewership of televised Nanjing 2014 YOG. This regression model explained a bit more than 11% of the variance (R^2 = .113) on the dependent variable. Third regression analysis indicated very consistent results as the second regression analysis. In this test, personal familiarity with YOG (α = .002) statistically significantly predicted respondents' use of social media related to 2014 Nanjing YOG, explaining 10% of the variance (R^2 = .100). Examinations of the univariate coefficients indicated that both of the statistically significant impact were on positive directions (i.e., β = .237 and .218, respectively). Examination of tolerance and VIF values for the overall variables indicated no concern of multicollinearity for these tests.

Table 3
Multiple Regression Analyses

		Standardized Coefficients		
Independent Variables	Dependent Variables	Beta	*t*	*Sig.*
Familiarity with YOG	To attend Nanjing YOG	.122	1.663	.097
Public Awareness of YOG		.083	1.122	.263
Familiarity with YOG	To watch televised Nanjing YOG	.237	3.368	.001**
Public Awareness of YOG		.134	1.905	.058
Familiarity with YOG	To follow Nanjing YOG on social media	.218	3.076	.002**
Public Awareness of YOG		.131	1.850	.065

Note. To minimize type I error, alpha level has been adjusted from .05 to .017 (Hair et al., 2010).

Discussion

Because the YOG is an event specifically targeting youth and young adults, it is of utmost importance that children, teenagers,

and young adults have knowledge of it so that the event can continue to show growth and positive impact measures in the future. Despite the fact that the YOG was in progress when this survey was administered, the findings indicate the students' awareness and willingness to engage in the events was extremely low. The results reveal that there has been no improvement in either awareness of or planned participation in the YOG since the inaugural YOG in 2010. The sample of respondents for this survey had an average age of 19, indicating that a majority of the participants were within the same YOG participant age group as seen during the 2010 games in Singapore. The results also indicate that 88% of the participants had some sort of athletic background, either competitive, recreational, or both. Even though they met the age requirement to participate and did participate in competitive and recreational sports, few study participants knew the YOG were occurring, nor were they informed about the event by any of their coaches, physical education teachers while in high school, or kinesiology instructors in the university environment. This finding suggests that the current IOC marketing strategy may not effectively engage the target population of the YOG such as was evident in this study. Similarly, the findings suggest that professional organizations for physical educators, coaches, and other movement professionals are doing a poor job of raising awareness of the YOG within such societies, but additional study is needed before drawing definitive conclusions on the role these professional societies may have in helping the IOC to raise consciousness on this topic.

Formulating effective positioning strategies for the YOG will enable marketers to connect with target audiences. The IOC's desire to specifically engage young adults in the Millennial and Post-Millenial, or "Generation Z," generation creates challenges due to unique attitudes, values and personality traits (Twenge & Campbell, 2012). Millennials are typically not "joiners" and are more difficult to engage when subjecting them to new ideas and activities such as the YOG (Keeter & Taylor, 2009). The largest group of parents globally is currently considered "Generation X," and to target this population who must support their youth in engaging in events such as the YOG, one must understand how messages will motivate them. For example, Generation X is typically skeptical by nature and is often motivated by the thought of service-oriented initiatives (Williams

& Page, 2011). Tying the YOG opportunity to parents through this lens, as something that benefits them, their children, and the broader global community, will ultimately provide results that support the Olympic mission. Generation Z is the most tech-savvy and global generation to date, and any efforts to reach this group must consist of messages that are inclusive and readily available across multiple delivery channels (TV, Internet, tablet, mobile devices, etc.; Williams & Page, 2011). By better understanding the unique characteristics and behavior of Generation X, Millennials, and Generation Z, marketers can develop effective messaging to increase event engagement for this population.

One of the most startling findings of the survey dealt with social media. Teenagers and young adults are frequently on social media (Madden et al., 2013). Park and Calamero (2013) reported that 95% to 97% of teens and young adults use the Internet on a daily basis. The present study shows that almost all of the participants had a smart phone (n = 271, 94.8%) and/or a tablet (n = 107, 37.4%), both of which are typically highly utilized by youth and young adults for social media usage. The participants stated that, on average, they frequently keep up with sports teams on social media (M = 1.98 on a 4-point scale). However, when asked about following YOG on social media, only two participants reported following the 2010 games (0.7%) and only one reported following the 2012 Innsbruck Games (0.4%). When asked about following the 2014 games in Nanjing, the average participant prediction value was low (M = 2.17 on a 7-point scale). In comparison, the value for following the Sochi WOG (n = 59, 20.6%) and the predicted value for following the Rio Olympic Games (ROG) in 2016 (M = 4.69 on a 7-point scale) were much higher than those of the YOG. This is the ultimate indicator that teenagers and young adults do not have enough awareness of the YOG in order for the event to achieve its planned objectives.

Logo recognition is another important indicator of the level of YOG awareness among the participants in the study. When asked to identify the correct logo for the 2014 Nanjing YOG, about 37% (n = 107) of participants were able to do so correctly. The study also requested logo identification for the ROG (n = 174, 60.8%), LOG (n = 107, 37.4%), and WOG in Sochi (n = 79, 27.6%). In this instance, the difference was not as drastic. However, more people were able

to identify the logo of the ROG, an event that was not taking place for another two years, than an event that was occurring at the time when the survey was conducted. In sum, these students majoring in Kinesiology were much more aware of the upcoming Olympic Games than they are of YOG, which were transpiring at the time of this survey. Again, this type of finding signals a failure in the marketing of the YOG to generate desired visibility when compared to other Olympic events.

Regardless of whether the participants had previous awareness of the event or not, the results indicate that very few had intentions to attend the event. Since the location of the YOG takes place in an area very far from the Midwestern university where this study was conducted, this is not surprising. Further studies should take a similar methodological approach but using subjects from the location of the Games or relatively near it. This would be a more sensitive way of determining the number of people intending to attend the games, since individuals would not be as likely to attend the games just to spectate if it was far away from their home country.

To summarize, the student participants had limited awareness of the YOG, especially compared to what they knew about other IOC events. The results expose a lost opportunity for the IOC to date in terms of marketing the YOG, as the findings suggest the findings suggest that the participants in this study were largely unaware of the Games, despite being of eligible age to actually participate in the events. Extrapolating these results to broader global health concerns, the YOG have been largely ineffective to date in helping to realize the IOC's goal of prompting greater physical activity and/or sporting participation; it stands to reason that more people need to be aware of the YOG before these Games can help to serve as an antidote to the growing prevalence of sedentary lifestyles and obesity that are increasingly common across the globe. More specifically, a lack of awareness about the YOG among children, adolescents, and adults could result in a failure to stimulate a broad base of participants, and ultimately a discontinuation of the Games. Wider acknowledgement of the YOG through more effective branding and marketing/PR will be required to generate broader interest and motivate both today's youth and their parents, as well as future generations, to engage in the Games through actively competing, attending, or following via social media.

Limitations

Although strong results were found in this study, readers may use caution when making application of these results beyond the population used in this study. Participants were found from one Midwestern University which may not provide an accurate depiction of the entire young adult population, especially when considering the global nature of the YOG. Last, caution may be required due to the nature of using self-report measures within this survey sample.

Practical Applications

In order to make a change in the level of YOG awareness in children, adolescents, and young adults, several groups of people need to take these findings as a call to action. Specifically, the IOC needs to work on advertising and marketing the event to young people, their parents, their physical education teachers, and coaches/youth sport administrators. As has been demonstrated by previous studies (Ghimire & Rao, 2013; Opree, Buijzen, Van Reijmersdal, & Valkenburg, 2014), advertising has a huge impact on children, in both positive and negative forms. If the IOC can utilize a comprehensive marketing campaign to raise awareness globally about the YOG across multiple generations, the event will benefit in both the short- and long-term and will ultimately meet stated objectives of increased physical activity and enthusiasm for global sport participation.

However, the IOC is not the only group responsible for getting the word out about the YOG, nor is the IOC the only organization to have vested interests in promoting physical activity such that it can help to eradicate sedentary lifestyles and childhood obesity levels. It is important for parents, coaches, and physical education teachers to discuss the YOG in person with their children and athletes. Physical education teachers and coaches see their athletes frequently, and can see progress that these students and athletes make in their designated sports or in class. Physical education teachers and coaches are the professionals most likely to identify Olympic-level potential in a child or adolescent. If they see this potential, they are responsible for helping the athlete reach Olympic-level play by connecting the athlete to organizations associated with this level of preparation

and competition. They can also work with the parents to make sure that everyone is helping the athlete get to events such as the YOG. Properly promoted and supported, the YOG can offer unique opportunities for positive physical activity experiences, which is an important public health consideration in light of research evidence that suggests the perpetration of adolescent behaviors is important as individuals move into adulthood (Biro & Wien, 2010).

Additionally, physical educators and coaches need to make their athletes aware of the YOG so that they can watch the games and learn from the Olympic athletes. For children and adolescents, it can be intimidating to watch the regular Olympics, because the athletes are so much older than them and the level of ability may seem unachievable. However, if they see people their own age participating in the Games, the competition becomes more accessible. They can watch and learn how to improve their own personal performance, making them an overall better athlete. Physical education teachers and coaches are also great for getting the word out to the parents of their athletes. If the coaches inform the parents, the games may be followed at home as well as at school or through the sports team.

The YOG present a unique and beneficial opportunity for both current and future generations of youth athletes, by increasing cultural awareness and promoting healthy living through sport. However, the games will be unable to succeed and continue broad-based awareness does not quickly develop. Though it is imperative for the IOC to take action, their global marketing efforts are not the only solution to this problem. Ordinary people, including physical educators, coaches, and parents, can increase awareness of the event through grassroots efforts and encouragement of youth and young adults to consider participation in and monitoring of the games.

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