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FITNESS

Comparing Levels of Anti-Fat Bias Between American and Mexican Athletes and Undergraduate Physical Education and Exercise Science Students

Miriam Wood Alameda and James R. Whitehead

Abstract

Stigmatization consequent to anti-fat bias (AFB) may affect the services people who are obese receive from health professionals, including physical education and exercise science (PEX) professionals. In this study, we compared AFB levels of American and Mexican PEX students and Mexican athletes. We also investigated if socially desirable (SD) response tendencies threaten the validity of the explicit AFB measure used in this study. Participants (N = 118) completed measures of explicit and implicit AFB. Explicit AFB scores were not different between groups, but there were some subsample differences and interactions on the implicit AFB measure. Most implicit AFB subsample scores were significantly different from 0, indicating the participants were, to some extent, implicitly biased against fat people. The correlations between SD scales and the explicit AFB scales indicated no substantive threat to the validity of those scales. These results indicate AFB may be an issue with future PEX professionals, and thus, further research on incidence levels and prevention strategies is warranted. Also, because explicit and implicit AFB scores were not significantly correlated, researchers should investigate whether implicit bias affects an individual's explicit bias.

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In 2012, the Organisation for Economic Co-operation and Development (OECD) reported that 35.5% of American men and 32.2% of American women are obese. Similarly, 34.5% of Mexican men are obese and 24.2% of Mexican women are obese. These statistics indicate that the United States and Mexico rank as the top two countries with the most people who are obese in the hemisphere. Along with the data on obesity, researchers have linked body image perceptions with ethnicity, finding that Caucasian Americans and Hispanics have unrealistic body image perceptions compared to other groups and define the ideal male physique as toned and the ideal female figure as thin or thinner than average (Altabe, 1998). Thus, not only do these two countries have high obesity rates, but they also have a cultural tendency to judge people who are obese as not as socially acceptable as slimmer people. This raises the question of whether those body-related social biases could affect health and wellness programming and care of individuals who are obese.

Indeed, current research indicates the reasons for poor participation in health-exercise programs include reduced access to facilities, lack of confidence and enjoyment, health issues, and the discouragement that stems from negative comments toward the obese by professionals in the health and medical field (Chambliss, Finley, & Blair, 2004). These experiences can affect the confidence and health of many people who are obese, and the prevalence of such negative events provides evidence of what may be a pervasive anti-fat bias.

Anti-fat bias is “an obesity prejudice in which the attribute of being obese influences the expectations about the individuals, often in terms of negative character assessment such as laziness, lack of discipline, and incompetence” (Chambliss et al., 2004, p. 468). Many researchers have investigated anti-fat bias (e.g., Chambliss et al., 2004; O’Brien, Hunter, & Banks, 2007; Puhl & Brownell, 2001; Schwartz, Vartanian, Nosek, & Brownell, 2006). These researchers have also advocated for anti-bias educational interventions because individuals who are obese are being discriminated against on a constant basis.

Anti-fat biases can be held in either implicit or explicit ways. Implicit attitudes are “unidentified traces of the past experiences that mediate favorable or unfavorable feeling, thought, or action toward social objects” (Greenwald & Banaji, 1995, p. 8) that are produced in unconscious and automatic mode (Teachman & Brownell, 2001). In short, an implicit anti-fat bias is subconsciously (outside of an individual’s conscious control or even awareness) leaning toward thinking that obesity goes hand in hand with being a bad per-

son. On the other hand, explicit anti-fat bias is the set of beliefs and self-reported assumptions attributed to individuals who are obese (Chambliss et al., 2004). Similarly, Teachman and Brownell (2001) referred to the explicit bias as the negative attitude associated with being obese. In short, an example of an explicit anti-fat bias would be to express the opinion that people who are obese are lazy.

Professionals in many fields have been shown to hold anti-fat biases, and physical educators are no exception. Many researchers have found that weight or anti-fat bias may harm individuals who are obese in many situations. Individuals who are obese struggle with prejudice, weight discrimination, and anti-fat bias in school, in public settings, when seeking jobs and health treatment, when buying or renting a house, and in legal procedures (Candrell & Martinez, 1996; Chambliss et al., 2004; Pepper & Ruiz, 2007; Puhl & Brownell, 2001; Puhl, Wharton, & Heuer, 2009; Teachman & Brownell, 2001).

Weight bias has even been found among health professionals specializing in obesity. Schwartz, Chambliss, Brownell, and Blair (2003) studied professional researchers and clinical managers of obesity with a focus on the attributes these professionals associate with obesity, including categories such as good–bad, motivated–lazy, smart–stupid, and valuable–worthless, and they found significant explicit anti-fat bias. According to Schwartz et al. (2003), this bias could affect job performance. For example, physicians reported a weight bias when taking care of patients who are overweight and often shortened the examination of the patient (Schwartz et al., 2003). These are barriers clients who are obese encounter in the health-exercise field, and consequently, a less comfortable environment becomes an obstacle to successful treatment.

In the physical education and exercise science (PEX) field, there is also evidence of discrimination, weight bias, and anti-fat bias against people who are obese. Studies have shown that compared to psychology students, PEX students display a strong implicit negative prejudice toward individuals who are obese. In addition, they are more explicit in the belief that people who are obese are not persistent in their efforts to lose weight (Chambliss et al., 2004; O'Brien et al., 2007). Again, these findings indicate bias against individuals who are obese may produce a less supportive environment and consequently hinder their chances of successful weight management.

Robertson and Vohora (2008) also examined the presence of bias within fitness professionals and regular exercisers. Both groups displayed a significant anti-fat bias. In fact, female exercisers displayed

greater anti-fat bias in implicit and explicit evaluations. Likewise, fitness professionals and regular exercisers who have never been overweight showed a greater anti-fat bias, in a similar manner to the bias that has been shown to exist in other health-related professionals. Robertson and Vohora concluded their study indicates a need for intervention to improve professionals' attitudes and behaviors so their services could better contribute to clients' healthier life.

More recently, Fontana, Furtado, Marston, Mazzardo, and Gallagher (2013) investigated the implicit and explicit attitudes about students who are obese held by physical educators and physical education students. They also administered the Perceptions of Obese Students by Physical Education Teachers (POSPET) questionnaire—a scale used to track how the physical education teachers feel about students who are obese during class time. A neutral attitude was found on the explicit measure, and even a pro-fat bias in the POSPET measure, meaning the future professionals ostensibly cared for the students who are obese and aimed to give equal treatment during class time. However, in contrast to the explicit measures, the physical educators showed negative attitudes toward students who are obese on the implicit bias measure.

This latter study especially highlights the common discrepancy between implicit and explicit attitude scores that others have noted. For example, in the Chambliss et al. (2004) study on exercise science students, the participants did not display a high bias score on the explicit scale, but many showed a strong implicit anti-fat bias. Thus, these results raise a methodological (validity) issue regarding the possibility that explicit measures of anti-fat bias have a tendency to elicit socially desirable responses (i.e., respondents do not openly admit their prejudices). The researchers (Lewis, Cash, Jacobi, & Bubb-Lewis, 1997) who developed the explicit measure—the AFAT—have argued the instrument is not susceptible to socially desirable responding because they tested that possibility by checking for correlations of the AFAT items with scores on Crowne and Marlowe's (1960) Social Desirability Scale. Why then, don't the explicit biases show up when implicit bias is revealed by the Implicit Association Test? One possibility could be that the Crowne and Marlow scale is not sufficiently sensitive or is not sophisticated enough to reveal socially desirable responding on the explicit measure. However, newer and more sophisticated measures are now available, such as the Balanced Inventory of Desirable Responding (BIDR; Paulhus, 1988, 1991, 2002), that may be more effective in

revealing if any socially desirable (SD) response tendencies are an issue regarding the validity of the AFAT. This question is of obvious concern because if the validity of explicit measures is in doubt, the methodological integrity of research in this area could be seen as questionable.

In summary, the literature on anti-fat bias (and its consequences) indicates that it is an issue of sufficient concern to health professionals, including exercise professionals and physical educators, to warrant further research, including in cross-cultural contexts. Thus, the primary purpose of this study was to study and compare explicit and implicit anti-fat bias ratings of Mexican and American samples of undergraduate PEX students and Mexican athletes. As a secondary issue, we also investigated a relevant psychometric concern: the possibility the explicit (AFAT) measure is prone to eliciting SD response tendencies.

Method

Participants

Data from 114 (45 women, 69 men) Mexican and American PEX students ($n_{\text{American}} = 63$, $n_{\text{Mexican}} = 40$) and Mexican athletes ($n = 15$) were ultimately included in the study (see Results section for reasons for exclusion of some participants). The PEX students were recruited from their university programs. Athletes were recruited through their current coaches or directly in person. Their ages ranged from 18 to 65 years old. The sample was predominantly of Caucasian and Hispanic ethnicity. Participants were either American or Mexican citizens. IRB approval was obtained from the American university and a collaboration letter from the Mexican university was filed prior to the study being conducted.

Instrumentation

Two measures of anti-fat bias were used in this study. The Antifat Attitudes Test (AFAT) is a questionnaire designed to measure explicit bias toward individuals who are obese using traditional self-report format (Lewis et al., 1997). The instrument consists of 47 statements about people who are fat, and items are rated using a 5-point Likert-type scale with verbal anchors ranging from *strongly disagree* to *strongly agree*. The questionnaire has three subscales—social/character disparagement, physical/romantic unattractiveness, and weight control/blame—as well as a total composite score. Sub-

scale internal consistencies ranging from .77 to .85 and an overall internal consistency of .95 have been reported in the literature (Lewis et al., 1997).

The Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) is used to measure individual differences in implicit cognition that stem from automatic associations between descriptors by comparing participants' reaction times when they classify positive or negative bias-related words that are alternatively paired with the object of the bias (for details see http://www.yaleruddcenter.org/resources/upload/docs/what/bias/iat_instructions.pdf). IAT measures have primarily been used to examine social prejudice against different groups (e.g., racial stereotypes). However, the IAT has also been used to assess implicit anti-fat bias in physical educators (O'Brien et al., 2007), attitudes toward individuals who are obese among exercise science students (Chambliss et al., 2004), and weight bias among health professionals specializing in obesity (Schwartz et al., 2003).

Participants completed the IAT to assess the attributes of good–bad, smart–stupid, and motivated–lazy with the target categories of fat people and thin people. These attributes were selected because they represent common anti-fat stereotypes and have been examined in prior studies in which the IAT was used (Schwartz et al., 2003). Participants completed the IAT by classifying words into categories. Checkmarks were used to classify the words into categories indicated at the top of each page.

Participants had 20 s to complete each of the IAT tasks, and each measure was repeated with the pairing reversed. The IAT was then scored by subtracting the number of words correctly classified when the term *fat people* was paired with the negative attributes (i.e., bad or lazy) from the number of words correctly classified when the term *fat people* was paired with the positive attribute, or implicit anti-fat bias. See Figure 1.

To adjust for differences in number of items completed, the difference scores were inserted into the following algorithm (Teachman & Brownell, 2001) in which maximum and minimum represent the category pairing with highest versus lowest number of items correctly classified: $(\max/\min - 1) \times \text{square root of } (\max - \min)$. Unlike traditional self-report questionnaires, the IAT is used to measure associations and preferences that exist beyond conscious evaluation, thereby providing an operational measure of bias of which people may be unaware or unwilling to report.

Fat People		Thin People
fat		slim
obese		thin
large		skinny
Motivated		Lazy
determined		slow
motivated		lazy
eager		sluggish
Fat People Motivated		Thin People Lazy
	obese	
	sluggish	
	slim	
	eager	
	large	

Fat People		Thin People
fat		slim
obese		thin
large		skinny
Lazy		Motivated
slow		determined
lazy		motivated
sluggish		eager
Fat People Lazy		Thin People Motivated
	obese	
	sluggish	
	slim	
	eager	
	large	

Figure 1. Example of the IAT for the stereotypes of motivated versus lazy. On the left, fat is paired with motivated and thin with lazy. On the right, the categories are reversed: Fat is paired with lazy and thin with motivated.

Because differences between implicit and explicit bias often occur, we also investigated the possibility that SD response tendencies could affect the validity of explicit measures. Specifically, the Balanced Inventory of Desirable Responding questionnaire version 6 (BIDR-6) was used to evaluate social desirability issues regarding the AFAT. The BIDR-6 (Paulhus, 1988, 1991, 2002) is used to assess two dimensions of social desirability termed *self-deceptive enhancement* (SDE) and *impression management* (IM). In previous research, it has been found the IM scores can indicate when participants are “faking” their understanding of the instructions to deny a “self-representation” (Paulhus, 2002). Similarly, the SDE component can indicate “self-deceptive distortions” (Hoorens, 1995; Paulhus, 1988).

The IAT, the AFAT, the BIDR-6, and the demographic questionnaires were translated by the principal investigator and three others

using a reverse translation method. First, the IAT, the AFAT, and the BIDR-6 were translated from English to Spanish. Then bilingual (English and Spanish) speakers were asked to translate the questionnaires in Spanish back to English. This process was repeated until the translations matched their original versions

Procedures

The instruments were administered in both countries to groups of PEX students during class time. Athletes were given the questionnaires before practice. The data collection process spanned 2.5 weeks in the United States and 2 weeks (two trips) in Mexico.

Step 1. The participants were informed about the study and asked to sign an informed consent form. Participants' responses to the questionnaires were coded with a number after administration so the responses remained anonymous.

Step 2. The participants started the process by listening to the researcher instructions and guidance (doing the timing as well) throughout the IAT test (pencil and paper version). After completing the IAT timed test, the participants answered the AFAT questionnaire, followed by the BIDR-6 questionnaire and the demographic questionnaire.

Step 3. After the measures were completed and collected, the students and athletes were debriefed on the purpose of the study and the problem of anti-fat bias within the health environment. The same procedure was followed in Mexico, except Spanish versions of the instruments were used.

Results

The initial data screening was $N = 127$. After a second data examination, six participants were removed because they only classified four or fewer words per IAT test administered or classified more than 35% incorrectly. Another two participants were removed from the main data because they were not citizens of the United States or Mexico.

The descriptive statistics for the overall sample and for the Mexican and American samples are presented in Table 1. The intercorrelations between variables are presented in Table 2.

Table 1
Descriptive Statistics

Group	Variables	<i>N</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum	Scale alpha
Total	Age	116	23.80	9.12	18.00	68.00	
	Height	113	67.95	15.39	60.00	79.00	
	Weight	118	164.26	30.23	104.00	300.00	
	AFATTot	115	2.39	.50	1.47	3.83	.92
	AFATSoc	119	1.88	.56	1.00	3.40	.84
	AFATPhys	117	2.85	.62	1.40	4.50	.76
	AFATBlame	117	3.09	.63	1.44	4.78	.73
	IATgood-bad	118	3.79	3.40	-6.00	14.14	
	IATsmart-stupid	118	4.74	3.91	-4.08	16.97	
	IATmot-lazy	118	3.19	4.85	-16.66	18.40	
	SDE	105	4.47	.67	2.95	6.20	
	IM	108	3.83	.82	1.95	6.45	

Table 1 (cont.)

Group	Variables	<i>N</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum	Scale alpha
Mexican	Age	53	27.23	12.57	18	68	
	Height	53	67.02	3.48	60.0	75.0	
	Weight	55	156.57	24.54	104.00	203.00	
	AFATTot	52	2.34	.50	1.47	3.49	.91
	AFATSoc	56	1.83	.54	1.00	3.27	.82
	AFATPhys	54	2.71	.65	1.40	4.50	.73
	AFATBlame	54	3.19	.60	1.44	4.56	.61
	IATgood-bad	56	2.55	3.37	-6.00	14.14	
	IATsmart-stupid	55	5.80	4.46	-4.08	16.97	
	IATmot-lazy	55	1.82	5.61	-16.66	18.40	
	SDE	47	4.54	.73	3.30	6.20	
	IM	50	3.87	.86	2.15	6.45	

Table 1 (cont.)

Group	Variables	<i>N</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum	Scale alpha
American	Age	59	20.85	1.85	18	28	
	Height	57	68.68	4.22	61.0	79.0	
	Weight	59	170.49	33.26	123.00	300.00	
	AFATTot	59	2.41	.51	1.53	3.83	.94
	AFATSoc	59	1.92	.57	1.00	3.40	.86
	AFATPhys	59	2.94	.59	1.80	4.30	.80
	AFATBlame	59	2.97	.65	1.89	4.78	.82
	IATgood-bad	58	4.94	3.07	-2.77	12.60	
	IATsmart-stupid	59	3.80	3.09	-2.42	15.17	
	IATmot-lazy	59	4.44	3.78	-3.83	17.59	
	SDE	55	4.41	.63	2.95	5.75	
	IM	54	3.77	.76	1.95	5.70	

Note. AFATSoc = social/character disparagement; AFATPhys = physical/romantic unattractiveness; AFATBlame = weight control/blame; SDE = self-deceptive enhancement; IM = impression management.

Table 2
Intercorrelations Between AFAT and IAT Subscales

Subscale	AFAT Soc	AFAT Phys	AFAT Blame	IATgood-bad	IATsmart-stupid	IATmot-lazy	SDE	IM
AFATSoc		.67****	.51****	.06	.14	.15	-.07	-.10
AFATPhys			.58****	.11	.03	.21	-.11	-.10
AFATBlame				.00	.19*	.03	-.00	-.01
IATgood-bad					.19*	.43****	-.00	.19*
IATsmart-stupid						-.03	-.04	-.11
IATmot-lazy							-.03	.03
SDE								.39****

Note. AFATSoc = social/character disparagement; AFATPhys = physical/romantic unattractiveness; AFATBlame = weight control/blame; SDE = self-deceptive enhancement; IM = impression management.

* $p < .05$. ** $p < .01$. *** $p < .005$. **** $p < .001$.

Explicit Attitudes

Because the AFAT was translated into Spanish, Cronbach's alpha reliability coefficients were computed as a check on the internal consistency of the subscales of the instrument. For the overall scale (AFAT), the alpha coefficients were .92 for the total sample and .91 and .94 for the Mexican and American subsamples, respectively. In no case would removal of any items have raised the scale alphas. For the Social/Character Disparagement (AFATSoc) subscale, the overall alpha was .84, but Items 21 and 31 were slightly problematic in that their removal would have raised the scale alpha slightly to .85 and .86, respectively. For the Mexican sample, the scale alpha was .82, but again, Items 21 and 31 were slightly problematic in that their removal would have raised the scale alpha to .83. For the Physical/Romantic Unattractiveness (AFATPhys) subscale, the overall alpha was .76, but Item 40 was problematic in that its removal would have raised it to .80. For the Mexican sample, the scale alpha was .73, but removal of Item 40 would have raised it to .77. For the American sample, the subscale alpha was .80, but removal of Items 40 and 42 would have raised it slightly to .82 in both cases. For the Weight Control/Blame (AFATBlame) subscale, the overall alpha was .73. For the Mexican sample, the scale alpha was .61 and Item 4 was problematic in that its removal would have increased it to .63. For the American sample, the scale alpha was .82 and all items were satisfactory. Because the AFAT instrument is widely used (Lewis et al., 1997), and because any item deletions would have only resulted in minor scale coefficient changes, it was decided to leave the subscales unaltered for further analyses.

To check for gender differences, and because the Mexican sample included data from athletes who were not also PEX students, two-way (Gender \times Subsample) ANOVAs were computed to see if the main analyses could simply compare Mexican to American participants or if more detailed analyses were necessary. There were no significant differences on any of the AFAT scales, so the whole Mexican sample was compared to the American sample (see Figure 2).

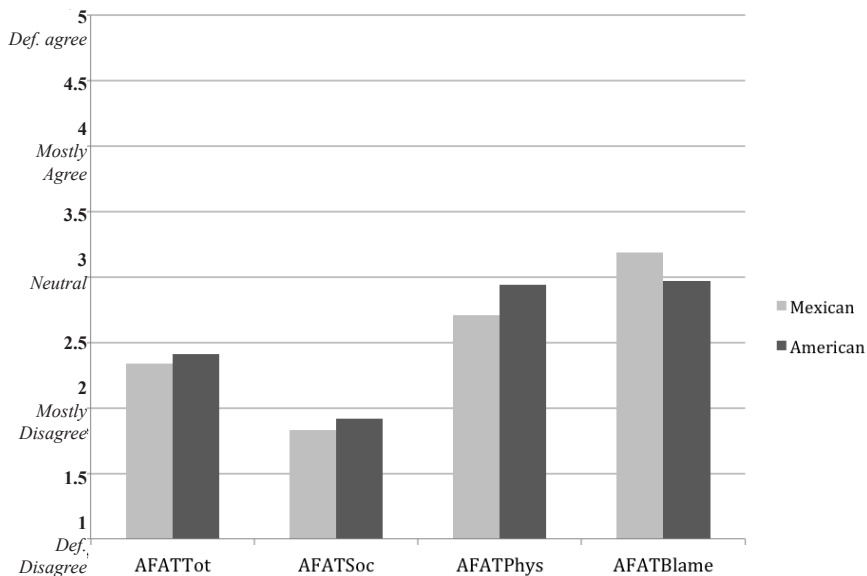


Figure 2. Mexican and American AFAT scores. AFATSoc = social/character disparagement; AFATPhys = physical/romantic unattractiveness; AFATBlame = weight control/blame.

Generally, the mean scores on the total AFAT scale and its three subscales (Figure 2) do not represent anti-fat bias attitudes with the exception of the Mexican sample's score (3.19) on the Weight Control/Blame (AFATBlame) subscale, which was slightly above the theoretical midpoint of the scale (3.0). Independent *t* tests revealed no significant differences between Mexican and American scores on the total AFAT scale, or its three subscales, although the differences between American and Mexican scores neared significance ($p = .06$) on the AFATPhys and AFATBlame subscales.

Implicit Attitudes

There were differences on each of the adjusted IAT scores. Specifically, when good–bad was paired with thin vs. fat, there was an effect for subsample, $F(2, 111) = 4.71, p < .05$. Post hoc tests (Tukey's) revealed American students scored higher than Mexican students ($M = 4.68$ vs. $2.63, p < .01$). Similarly, there was an effect for subsample when smart vs. stupid was linked to thin vs. fat, $F(2, 111) = 8.20, p < .001$. Post hoc tests (Tukey's) revealed the Mexican students ($M = 6.76$) scored higher ($p < .001$) than the Mexican athletes ($M = 4.08$) and significantly higher ($p < .05$) than the American

letes ($M = 4.08$) and significantly higher ($p < .05$) than the American students ($M = 3.62$). Finally, there were no main effects for gender or subsample when motivated–lazy was paired with fat vs. thin, but there was a significant interaction effect, $F(5, 111) = 3.66, p < .05$. All scores are plotted in Figure 3 to allow a detailed view of which of them were different from 0, indicating implicit anti-fat bias.

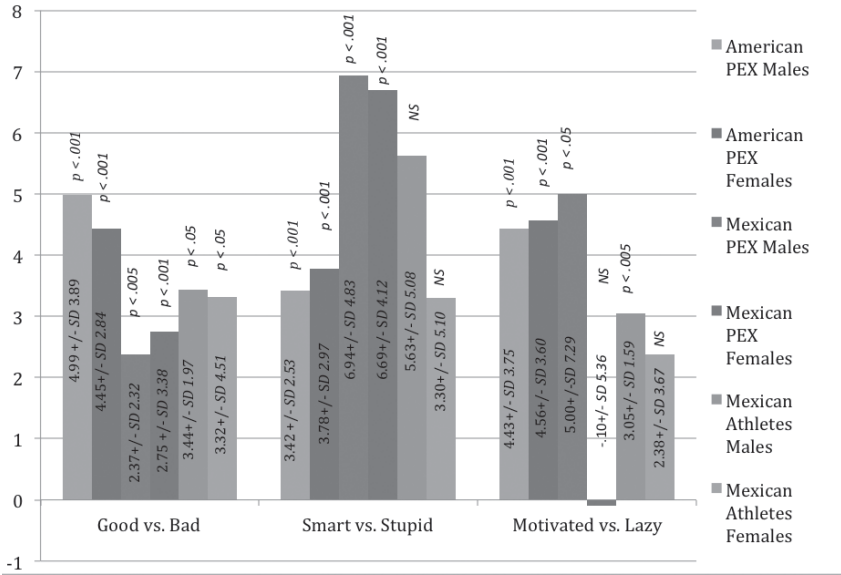


Figure 3. Mexican and American adjusted IAT scores. This figure shows the levels of implicit anti-fat bias for each subsample. The p -values indicate if the scores are significantly different from 0, indicating anti-fat bias.

Socially Desirable Response Tendency Issues

Pearson correlation coefficients were computed to ascertain the relationship between the elements of SD responses to the scales and individual items of the AFAT. None of the AFAT subscales were statistically significantly correlated with either the SDE scale or the IM scale of the BIDR-6 questionnaire. However, six of the 47 AFAT items were statistically significantly correlated with the IM scale, and one of those was also correlated with the SDE scale. The statistics of those six AFAT items are presented in Table 3. One of the implicit measures (IAT_{good–bad}) was statistically significantly correlated with IM ($r = .19, p < .05$).

Table 3

Correlations of AFAT Items With Self-Deceptive Enhancement and Impression Management

AFAT scale	Item #	SDE		IM	
		<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
AFATSoc	17			-.22	< .01
AFATPhys	32	-.27	< .01	-.19	< .05
	36			-.22	< .05
AFATBlame	43			-.25	< .01
AFATOthers	3			-.21	< .05
	47			-.21	< .05

Note. SDE = self-deceptive enhancement; IM = impression management; AFATSoc = social/character disparagement; AFATPhys = physical/romantic unattractiveness; AFATBlame = weight control/blame.

Discussion

A key finding of this study was the scores of the American and Mexican samples did not show problematic levels of explicit anti-fat bias, and both samples scored similarly on all three subscales (Social/Character Disparagement, Physical/Romantic Unattractiveness, Weight Control/Blame) of the AFAT measure. Thus, these results were different from prior cross-cultural research. For example, Pepper and Ruiz (2007) found that European American women exhibited more anti-fat bias than highly acculturated Latina women, who in turn showed more anti-fat bias than low acculturated Latinas. Based on those results, Pepper and Ruiz, and others such as Candrall and Martinez (1996), predicted a higher level of anti-fat bias in the American groups on the basis that in the American culture, self-oriented ideals are generally followed and practiced, in this case, considering each other responsible for their own actions and consequences in regard to weight control. In contrast, the Mexican or Latino groups were seen as family oriented and to make decisions in groups, promoting acceptance toward each other (Candrall & Martinez, 1996). In both studies, the authors see Americans, because of their culture, as more likely to assign blame.

It is speculative, but one possibility why no explicit differences emerged is the Mexican sample (from Tijuana) of this study may be highly acculturated into the American “perspective” because of

the close geographical proximity with the U.S. border in California. However, direct comparisons of scores are not possible given that in the previous cross-cultural research, the researchers used the Anti-Fat Attitudes (AFA) questionnaire (Candrell, 1994), whereas we used the AFAT as the explicit measure questionnaire.

In regard to levels of implicit anti-fat bias, the results were somewhat different. Overall, the American sample scored higher in the good–bad and in the motivated–lazy subscales, but not the smart–stupid subscale. This means that in this study, the American sample was more prone to implicitly associate people who are fat with being bad and lazy (Figure 3). Our results are consistent with previous research (Chambliss et al., 2004; Schwartz et al., 2003; Teachman & Brownell, 2001) done on future exercise scientists and health professionals. In those studies, the participants displayed negative attitudes toward people who are obese, linking them with being bad and lazy. In the motivated–lazy link, the American sample showed a higher implicit bias in terms of stereotypically fatness with laziness. These results are also consistent with previous literature (Chambliss et al., 2004; Teachman & Brownell, 2001). Moreover, we investigated implicit anti-fat bias differences by gender; the results indicate no main effects, but the significant gender by group interaction is clearly a result of the Mexican PEX women not showing any stereotypical link between fatness and laziness (Figure 3). This result presents a contrast to previous findings; for example, Greenleaf, Chambliss, Rhea, Martin, and Morrow (2006) found similar levels of stereotypical bias, but no differences between Caucasian and Hispanic adolescents.

We also assessed the athletes' anti-fat bias because they are often perceived as role models. For instance, it is noted in the literature that fans tend to identify themselves with the athlete, the sport, or the team (Duncan, 2007). Thus, fans might be prone to endorse attitudes displayed by the athletes. Also, we examined this group because Chambliss et al. (2004) suggested that students tend to enroll in exercise science programs because they are interested in sports and physical activity, "which may contribute to a view of obesity as unacceptable" (p. 473). In our study, the male and female Mexican athletes displayed implicit anti-fat bias. However, there were no statistical significant gender differences in the Mexican or the American sample (Figure 3). Furthermore, cross-cultural investigation on athletes' implicit associations and stereotypes is needed.

Finally, prior research has shown only implicit anti-fat bias; thus, we speculated the students and the athletes self-report answers, on

the explicit measure, could be influenced by SD tendencies. Thus, we investigated the extent to which the explicit anti-fat bias subscales and individual items were prone to eliciting SD responses. Contrary to our initial hypothesis, the results indicate none of the AFAT subscales were significantly correlated with either the SDE scale or the IM scale of the BIDR-6 questionnaire (Table 3). Although six of the 47 AFAT items were statistically correlated with the IM scale, none of those associations were substantive enough to compromise the validity of the scales. At most, the correlations between the items and the IM only accounted for 6% of the variance explained. Thus, our results support the validity of the AFAT measure as it does not appear to be prone to eliciting SD responses.

Limitations

Our study had limitations. First, convenience samples were used. The students involved were only from two universities; in the United States, the participants were students from an upper Midwestern university, and in Mexico, the students were from a university close to the southwestern U.S. border. Thus, our results cannot be generalized to Mexican or American students as a whole. Second, because of the close geographical proximity of the Mexican group to the border with California, those participants may show similar tendencies to the American group. Finally, we did not examine language as a possible bias factor. Previous findings in cross-cultural research (Pepper & Ruiz, 2007) have shown that language interacts with body image. Pepper and Ruiz (2007) found that the participants who chose to respond in English scored a higher level of body dissatisfaction in the AFA.

Conclusions

The literature indicates anti-fat bias is a prevalent issue of prejudice and stereotype against people who are obese. Health and wellness professionals report they often hear statements such as this: “Our children will, instead of having to care for baby-boomers like we will, they will have to care for fat-boomers” (Duncan, 2007, p. 60). Some professionals think that perhaps it is okay to have biases, but they need to learn how to control them (Yale Rudd Center for Food Policy and Obesity, 2010). Specifically, explicit bias is an issue because “words can hurt, and they often do” (Duncan, 2007, p. 63).

In this study, the questionnaire responses of future physical educators, exercise science professionals, and athletes did not indicate

explicit bias, but their apparent levels of implicit bias may be an obstacle to their future roles in combating obesity in Mexico and the United States. According to Chambliss et al. (2004), there is no known link between implicit anti-fat biases and behavior. The Yale Rudd Center for Food Policy and Obesity (2010) suggested the anti-fat bias may be a product of the memory associations “between concepts” and the messages inherited in society in which *overweight* is a synonym of *bad*. However, what is known is anti-fat bias and weight discrimination are factors that could obstruct individuals who are obese from adopting a healthy lifestyle (Chambliss et al., 2004). This knowledge has important implications for practitioners, educators, and researchers.

In general terms, the implication for PEX professionals (e.g., physical education teachers, coaches, and exercise leaders) and those who prepare them (e.g., teacher and coach educators, exercise science professors) is it behooves them to try to prevent anti-fat bias from becoming a barrier that prevents students and clients who are overweight or obese from obtaining the many health and wellness benefits from participating in physical activity and sports. In a recent systematic review of qualitative studies of what “turns off” adolescents who are overweight or obese to exercise, Stankov, Olds, and Cargo (2012) highlighted the issue and gave excellent practical suggestions (e.g., having accommodating dress codes for PE, facilitating privacy in dressing rooms, adding greater physical activity choices to the curriculum, and providing leadership training to raise awareness and increase barrier prevention competencies). We concur, and we would add—from a public health perspective—that if physical education teachers, coaches, and exercise leaders genuinely subscribe to the value of physical activity as a health-promoting behavior, they should be prepared to make special efforts to allow those who need those benefits the most (students and clients who are obese and unfit) equal access and opportunity to obtaining them. These efforts would logically include using their professional skills and influence to make the ethos of physical education, exercise, and sport environments friendly and accepting of all body types and physical competencies. More simply put, students’ peers and parents need to be enlisted as part of the solution to anti-fat bias as well.

Similarly, the implications for researchers include a need to investigate the effectiveness of educational strategies designed to reduce the levels of anti-fat bias in future health professionals such as PEX students. Such strategies could include workshops or clinics specialized in exercise psychology, ethics, and health and wellness

or be used with a “consciousness raising” strategy as Chambliss et al. (2004) proposed. For researchers with interests in psychometrics and methodology, the issue of SD responses remains a mystery. Logically, because anti-fat bias is manifested in implicit but not explicit measures, we were expecting an association between SD and the AFAT scales. However, we found the participants did not display any substantive SD response tendencies in the AFAT measure—and the AFAT scales did not correlate with the IAT measures—indicating a lack of cognitive linkage between them. Thus, researchers could consider whether implicit affects an individual’s explicit bias because if it does not, there may be less reason for it to be a professional concern.

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FITNESS

Effect of Personalized System of Instruction on Health-Related Fitness Knowledge and Class Time Physical Activity

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Abstract

In previous studies, researchers have identified a general low level of health-related fitness (HRF) knowledge among secondary students that can effect levels of physical activity (PA). An instructional strategy that may increase HRF knowledge without decreasing PA is the personalized system of instruction (PSI). Two classes from a private urban high school in a major city within the Mountain West region of the United States participated in the 6-week study. Group 1 (n = 24) completed a unit on personal fitness using the PSI model, and Group 2 (n = 29) used a traditional DI approach. Knowledge was assessed 3 times (pre, post, 3-week follow-up) using a 45-question standardized HRF knowledge test. Class time PA was reported using a modification of the SOFIT observation system. A 2 × 3 ANOVA was used to compare HRF knowledge scores, showing a significant increase in Group 1 scores from pre- to posttest (p

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= 0.003) as well as significant increases in scores between Group 1 and Group 2 ($p = 0.03$). Physical activity results were compared using a pair-samples t test with outcomes revealing differences in class time PA levels ($t = -0.27, p = 0.79$). These results indicate PSI is a successful model for increasing HRF knowledge while maintaining physical activity levels.

According to the Centers for Disease Control and Prevention (CDC, 2011), participation in physical education (PE) is decreasing significantly during the secondary school years. Song, Carroll, and Fulton (2013) reported that only 16.3% of teenagers in the United States meet the CDC's recommended levels for physical activity (PA). As PA levels decrease, so do levels of health-related fitness (HRF; U.S. Department of Health and Human Services, 2010), which in turn leads to decreases in an individual's health (Eaton et al., 2012; Goldfield et al., 2011; National Center for Chronic Disease Prevention and Health Promotion, 2011). For adolescents, the natural venue for increasing PA and improving HRF is in PE classes (Moreno Murcia, Coll, & Ruiz Pérez, 2009; Pate, Ward, O'Neill, & Dowda, 2007; Sallis et al., 2012). This is good practice, but being physically active is only one goal of a quality PE program (American Alliance for Health, Physical Education, Recreation, and Dance [AAHPERD], 2013). By focusing solely on psychomotor outcomes, physical educators overlook the acquisition of the content knowledge related to health-related fitness (HRF), PA, and overall health.

Slingerland and Borghouts (2011) stated that PE can influence overall fitness levels of children and adolescents by engaging students in PA during class and instructing students to understand the benefits of PA outside of class. Yet traditionally there has been a lack of priority toward increasing the cognitive aspect of PE (Stewart & Mitchell, 2003), with several authors commenting on the lack of HRF knowledge and preparedness to engage in lifelong fitness in youth today (Brynteson & Adams, 1993; Dilorenzo, Stucky-Ropp, Vander Wal, & Gotham, 1998). As knowledge increases, adolescents possess a better understanding of a healthy life and what it takes to engage in PA (Keating, Harrison, Dauenhauer, Chen, & Guan, 2009). Ennis (2012) suggested these increases in knowledge can offset negative beliefs about fitness and combat the decline in PA within PE classes. Others have asserted that increased knowledge is more beneficial to lifelong fitness than increased in-class PA (Corbin & Lindsey, 2007). To assist students in becoming more ac-

tive during PE class, teachers need to be able and willing to provide quality instruction with appropriate instructional strategies (Bryan & Solmon, 2012) that address HRF knowledge and PA.

Eight common instructional models have been shown to be effective in teaching PE including direct instruction (DI) and the personalized system for instruction (PSI; Metzler, 2005). DI is a teacher-centered approach in which the instructor determines the majority of the content of the lesson and class and how much students are involved in participation (Méndez, Valero, & Casey, 2010). It has been suggested DI is an appropriate strategy to use when basic skill development and safety issues are of highest importance or when working with younger students in skill development (Ayers et al., 2004; Sweeting & Rink, 1999). The DI model requires the teacher to have a high level of expertise and to have control over the progression of the lesson including assessment, practice time, and tasks. As noted, this approach works well with skill development, yet has not proven to be as effective in developing HRF knowledge. Opponents of DI have stated that when a person uses this strategy, creativity and the ability to problem solve decrease (Peterson, 1979). If an outcome of a quality PE program is to have students be able to apply what they have learned in class (AAHPERD, 2013), they must be able to do more than restate concepts they have learned (Castelli & Williams, 2007).

Another instructional model is PSI. It was originally designed by Dr. Fred Keller in the early 1960s to replace traditional lecturing and incorporate an independent mastery learning approach to learning (Keller, 1968). The “Keller Plan,” as PSI is sometimes referred to, has five distinct characteristics: self-pacing, mastery learning, emphasis on the written word for learning, teacher as motivator, and the use of proctors (Keller, 1968). Since the mid-1960s, PSI has been used throughout the educational domain with tremendous success (Bangert, Kulick, & Kulick, 1983; Calhoun, 1977; Fell, 1989; Grant & Spencer, 2003; Johnson & Croft, 1975; Kulick, Kulick, & Cohen, 1979; Springer & Pear, 2008) including in PE. Successful use of PSI in PE has been documented for volleyball, golf, racquetball, and tennis (Metzler & Sebolt, 1994) as well as personal fitness (Colquitt, Pritchard, & McCollum, 2011). Hannon, Holt, and Hatten (2008) used this instructional model to teach HRF content knowledge in a high school weight training class. Pritchard, Penix, Colquitt, and McCollum (2012) used PSI to teach a weight training class. Their results show students significantly increased their HRF knowledge and fitness levels (curl-ups, push-ups, and body composition). These

results indicate that PSI not only increases student content knowledge, but also provides the PA needed to increase fitness levels. PSI has been researched in few studies at the high school level, but this strategy shows potential to be an effective mode of instruction to improve student HRF content knowledge.

PSI is a unique approach to increasing HRF content knowledge. Researchers have suggested the use of PSI increases student learning and allows for more PA through increased practice time and decreased teacher management time (Cregger, 1994; Metzler, 1986). However, few researchers have examined the effectiveness of PSI during a high school personal fitness class. Therefore, the primary purpose of this study was to investigate changes in HRF knowledge between a personal fitness class in which the PSI strategy was used and a class in which the DI model control was used. We hypothesized students in the PSI class would have significantly higher HRF knowledge gains after a 6-week study than students in the DI class. The second purpose of this research was to explore differences in PA between the classes. There are arguments indicating that concentrating on HRF knowledge can decrease overall class-time PA, which can be counterproductive for a standards-based PE class. Therefore, we hypothesized there would be no significant difference in PA levels between the PSI class and the DI class, signifying the potential to teach HRF while maintaining appropriate PA levels.

Method

Participants

Two PE classes from a local private high school in the urban area of a large city in the Mountain West region of the United States were recruited for this study. In one class ($n = 24$, $M_{\text{age}} = 15.4 \pm 1.23$ years), a personal fitness unit was implemented using the PSI strategy, and in the second class ($n = 29$, $M_{\text{age}} = 15.31 \pm 1.17$ years), a traditional DI approach was used to teach personal fitness. Approval from the school and university institutional review board was obtained and parental permission and child assent were granted prior to the beginning of the study.

Scheduling of the school allowed classes to meet in the school's weight room 4 days a week for 40 min. Available resources included a moderately sized fitness facility consisting of free weights, dumbbells, weight machines, and cardiovascular equipment. The classroom teacher (16 years of experience) was familiar with both instructional strategies. The principal investigator (PI) provided ad-

ditional training for the teacher in PSI philosophy and implementation.

Instrumentation

HRF content knowledge. Because of a lack of a standardized HRF knowledge assessment, a modified 45-question assessment pertaining to weight training and fitness was used to measure students' personal fitness content knowledge. The original assessment (Pritchard et al., 2012) had 50 questions initially, but five were dropped because of repetition and lack of relevance. Based on McGee and Farrow's (1987) test bank for PE activities, the assessment includes case studies and multiple-choice and true/false questions pertaining to cardiorespiratory endurance, muscle strength and endurance, flexibility, body composition, and nutrition. Students were awarded 1 point for each question, allowing them to score between 0 and 45 points. Assessment examples included the following:

- What is a function of fat?
- Which activity is the best example of aerobic exercise?
- Which is not a factor influencing flexibility?
- Which is the best example of measuring intensity for cardiorespiratory training?

The assessment and curriculum were evaluated by a certified strength and conditioning specialist from the National Strength and Conditioning Association as well as a high school PE teacher with over 12 years of teaching weight training classes to establish content validity.

Physical activity. Both classes were observed for levels of PA using a modification of the System for Observing Fitness Instructional Time (SOFIT; McKenzie, Sallis, & Nader, 1991) during class time to assess overall PA levels as well as time spent in moderate- to vigorous-intensity (MVI) activity. In this systematic observation, a 5-point scale is used to measure student PA: 1 = *lying down*, 2 = *sitting*, 3 = *standing*, 4 = *walking*, and 5 = *vigorous* (activity requiring more effort than walking). In SOFIT, a time interval of 10 s observation followed by 10 s of recording is used. Five students were observed based upon McKenzie's (2012) protocol of entering the room. The first participant was observed for 12 intervals (4 min) before moving to the second, then the third, and so forth. Students were observed for the entire class period (~32 min). Twelve class periods (six for each group) were observed during the 6-week study.

As no observation tools have been used for resistance training, modifications were made to the original SOFIT scale. The first two scores were kept and “spotting” was grouped with the third. For the remaining two levels, Ainsworth et al.’s (1993) compendium was consulted with MET values for walking (3.0) compared to values for light to moderate resistance training (3.0). Examples include bicep curls, abdominal exercises, and body weight activities. Vigorous effort was classified as activity requiring more effort than light to moderate effort (> 3.0 METS). Interrater reliability protocol established by McKenzie (2012) was followed with a result of 86.3%, exceeding the preestablished mark of 80% reliability.

Protocol

One week prior to the start of the study, students in both groups completed the fitness concepts assessment to establish baseline knowledge. Participants were instructed to answer the questions to the best of their ability. Upon completion of the 6-week study, participants completed the assessment to determine potential changes in knowledge. Students again completed the knowledge assessment 3 weeks poststudy to examine retention of learning.

PSI class. During the 6-week study, Group 1 followed a curriculum adapted from Colquitt, Pritchard, and McCollum (2011) for personal fitness in which the PSI model was used. The curriculum consists of 16 modules designed to teach HRF and introductory resistance training. A characteristic of PSI is the students’ ability to progress through the curriculum at their own pace, and they are allowed to choose which content or exercise skill modules they want to work on. Periodic reviews of the classes were conducted to provide necessary feedback to the classroom teacher to ensure fidelity of PSI (Tables 1 and 2). These reviews consisted of observation of student and teacher activity and student workbooks. If benchmarks were not being met, the PI would notify the classroom teacher and suggest strategies to meet standards.

Table 1*Teacher Fidelity Benchmarks for Personalized System of Instruction*

Benchmarks	How to verify
Teacher ensures PSI course materials are clear to students	Monitor the number and types of questions students ask after reading/viewing information in their workbooks.
Teacher has very low percentage of managerial time in class (< 2%)	Use a stopwatch to measure how much management time teacher uses in class.
Teacher has very high rates of individualized instructional interactions in class	Audiotape a lesson and count the number of cues, number of times feedback is given, and the number of questions directed to individual students.
Teacher sets performance criteria for tasks at appropriate levels of difficulty	Direct students to practice tasks in blocks (e.g., 10 trials) and to record the number of successful tasks in each block. If most students reach mastery after one or two blocks, the task is too easy. If many students get “stuck” on a task, it is too difficult. Adjust the task or performance criteria accordingly.
Teacher does not spend too much time witnessing and verifying mastery attempts	Count the number of times the teacher witnessed mastery attempts in each class. If that takes away from instruction time, (1) design more self- and partner-checked tasks or (2) appoint dependable students as temporary witnesses until the backlog is gone.
Teacher makes few or no task presentations	Count the number of task presentations made in class. If those presentations take away from instructional time with individual students, design and produce media-based task presentations.

Table 2*Student Fidelity Benchmarks for Personalized System of Instruction*

Benchmarks	How to Verify
Students have understood written or visual task presentation	Check for understanding. Monitor students on comprehension tasks that demonstrate key elements from the task presentation. Note the number and pattern of students' questions.
Students are staying on task	Periodically monitor and count the number of students who are on task in class.
Students can properly set up learning activities from the written task structure information	Observe several students setting up learning stations. Note how long it takes each one to set up and how correctly it is done.
Students do not make "inappropriate progress" (i.e., cheat on verifying mastery)	Review students' progress chart each day, looking for faster than expected progression.
Student progression is more or less even	Review personal progress charts often.

DI class. For the DI group, class content matched that used with the PSI group. The classroom teacher determined progression, evaluation, and time spent on each topic. Instruction, including demonstrations of lift techniques, was given to the class as a whole. Daily workouts were written on the board and explained to the students. The class was divided into three groups to prevent backlogs on equipment.

The following knowledge and skills were covered in both classes: fitness assessment; cardiovascular; resistance and flexibility training; fitness principles; program design; nutrition and fluid balance; and lifts for chest, legs, back, arms, and abdominals.

Data Analysis

We used a quasi-experimental, nonequivalent design (Campbell & Stanely, 1963) because we used preestablished classes. Data were

analyzed using SPSS 20 (SPSS, Inc., Chicago, IL) and checked for missing values, outliers, and normality. Missing data were excluded pairwise during analysis. Statistical significance was set at the 0.05 level for analyses. Scores from HRF were analyzed via a 2 (Group) \times 3 (Time) analysis of variance (ANOVA), and class PA differences were analyzed with *t* tests. Means and standard deviations of descriptive statistics are included in Table 3.

Table 3
Descriptive Statistics

Dependent variable	PSI (<i>n</i> = 24) <i>M</i> \pm <i>SD</i>	Control (<i>n</i> = 29) <i>M</i> \pm <i>SD</i>
Age (years)	15.40 \pm 1.23	15.31 \pm 1.14
Pretest Scores	13.72 \pm 3.89	12.90 \pm 5.23
Posttest Scores	17.60 \pm 6.59	14.14 \pm 4.68
% Time Spent in MVI	21	20.3

Note. MVI = moderate to vigorous intensity.

Results

HRF Content Knowledge

Pretest scores from the HRF were analyzed to determine significant differences prior to the beginning of the study (Campbell & Stanley, 1963). No significant differences were observed between groups at pretest, $F(1, 52) = 0.420$, $p = 0.52$. Test scores significantly increased, $F(1, 24) = 6.78$, $p = 0.003$, in the PSI group from pretest ($M = 13.72$, $SD = 3.89$) to posttest ($M = 17.6$, $SD = 6.59$). Significant differences in posttest HRF knowledge scores, $F(1, 52) = 5.05$, $p = 0.03$, were also observed between the PSI group ($M = 17.6$, $SD = 6.59$) and the control group ($M = 14.14$, $SD = 4.68$).

Physical Activity Levels

Results from the modified SOFIT observation tool were analyzed to investigate if there were significant differences between the two groups in time spent in MVI. A paired samples *t* test showed no significant differences ($t = -0.27$, $p = 0.79$) between the PSI group

(21% of time spent in MVI) and the control group (20.3% of time spent in MVI) during the 6-week study.

Discussion

It has been reported that PA decreases during the later adolescent years and students generally lack basic HRF knowledge (Placek et al., 2001; Stewart & Mitchell, 2003). Researchers have stressed the importance of HRF knowledge in maintaining PA and healthy lifestyles throughout adulthood (Corbin & Lindsey, 2007; Ennis, 2012; Keating, Harrison, Dauenhauer, Chen, & Guan, 2009; Slingerland & Borghouts, 2011). To overcome this trend, PE practitioners need to address the content of what they are teaching and the strategies they are incorporating to teach it. Successful incorporation of content knowledge and skills has been demonstrated to improve HRF knowledge and retention (Adams, Graves, & Adams, 2006). An effective model to develop skills in PE (Cregger, 1994; Cregger & Metzler, 1992; Colquitt et al., 2011; Pritchard, Peniz, Colquitt, & McCollum, 2012), PSI is an instructional strategy that can be implemented to teach HRF in secondary education (Hannon, Holt, & Hatten, 2008; Pritchard et al., 2012). Unfortunately, there is little research on PSI used to teach personal fitness in the high school setting. Therefore, the purpose of this study was to examine changes in HRF content knowledge and PA between a class in which PSI is used and a class in which DI is used.

Participants within the PSI class demonstrated significant increases in HRF content knowledge compared to their counterparts in the control class over the course of the study (Figure 1). The results show a significant increase in HRF knowledge in the PSI class compared to the DI class, but overall scores reveal both classes did not elicit passing grades (PSI = 37.7%, DI = 31.1%), even with the curriculum designed specifically for personal fitness and HRF knowledge. Previous research supports the results from this study, suggesting that many students lack HRF knowledge initially (Brusseau, Kulinna, & Cothran, 2011; Kulinna, 2004; Placek et al., 2001; Stewart & Mitchell, 2003; Thompson & Hannon, 2012). More effort needs to be made to provide opportunities for HRF content learning at all age levels.

Little research has been conducted in which researchers have examined how concentrating on HRF knowledge affects PA levels (Thompson & Hannon, 2012). A secondary purpose to this study was to examine potential differences between classwide activity

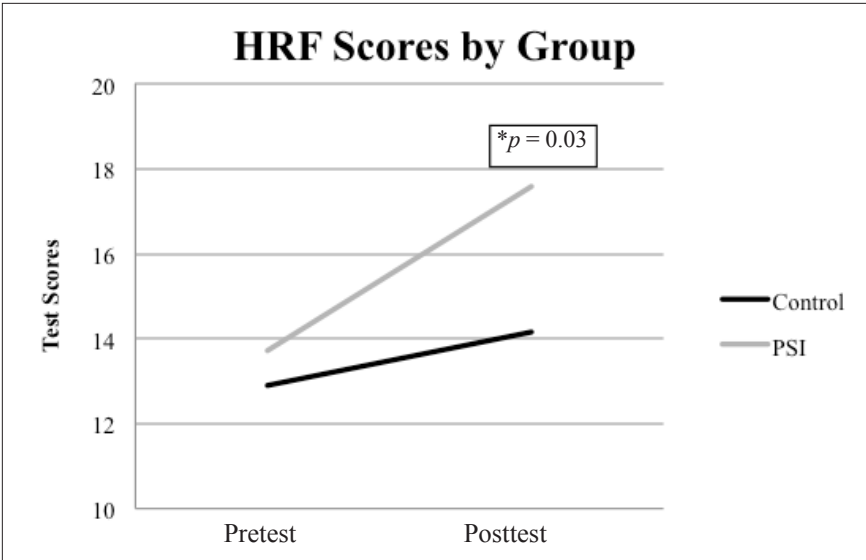


Figure 1. HRF test scores over time.

levels in a traditional DI approach and activity levels in a class in which the PSI strategy is used. This study shows no significant differences in class time PA between the two groups, indicating that through the use of PSI, students can increase their knowledge while maintaining current activity levels. Though this is one outcome, more research needs to be conducted to investigate potential relationships between knowledge and PA levels. With the national push to increase school-aged students’ PA (Let’s Move! Active Schools, 2014; National Board for Professional Teaching Standards, 2014), showing students how to be active is not enough. Educators and researchers need to be able to show students why and how to be physically active.

Two characteristics of PSI make it a unique strategy in education. The first is mastery learning. Students were required to complete assessments as they progressed through the modules. Each module required students to score 80% or higher on its quiz and to achieve 100% on individual assignments. If they did not reach these benchmarks, they were permitted to retake the quiz or recomplete the task until they demonstrated mastery of the subject. This emphasis on mastering the skills and content has been shown to improve feelings toward the topic and increase retention of the knowledge

learned (Guskey & Gates, 1986; Kulik, Kulik, & Bangert-Drowns, 1990).

The second unique characteristic of PSI is self-pacing. Metzler (2005) stated that when using the PSI model, students can progress “as fast as they want, or as slow as they need” (p. 221). Students who have experience or a background in the content are able to move at a quicker rate than those who are unfamiliar and need more time to learn and practice. This approach, along with increased practice times, couples with mastery learning to ensure students are confident and able to perform skills or retain content knowledge. In the traditional DI approach, the teacher determines the pacing of the course, thereby not allowing all students the opportunity to learn fully. With an increase in perceived competence through increased practice and feedback, students are more inclined to engage and participate in PE classes.

Although the results from this study are positive, generalizations should not be overtly made toward other curricula. PSI is effective for teaching skills in other activities, but we only examined HRF content knowledge compared to a non-PSI class. We suggest that more PSI research be conducted to examine differences between PSI and other models in all areas of PE.

This study had a few limitations. First, a relatively small sample size was used. This was a private school, and class sizes were generally under 28 students per class. A second limitation may be the lack of randomization. The classes recruited were used intact to maintain continuity for students’ schedules. Finally, there were few females in this study ($n = 7$).

As mentioned previously, we only examined changes in knowledge within a smaller school. We encourage in future research not only the examination of the use of PSI in personal fitness classes at various sized schools, but also in a variety of PE content, such as individual sports. Another suggestion for research would be to examine the use of technology (computer-assisted instruction) incorporated into PSI teaching.

Conclusion

The results from this study indicate the PSI model could be an effective way to increase HRF knowledge with high school students while not decreasing their PA levels within the class time. This study lines up with the literature in which a lack of HRF knowledge is demonstrated, indicating more research needs to be done into methods to reverse this trend. With the decrease in PA and HRF within

the adolescent population, effective instructional strategies need to be incorporated into everyday PE. By providing teaching that concentrates on the how and why of being healthy, teachers give students the tools needed to lead long, healthy lives.

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METHODOLOGY

Investigation of Pupils' Levels of MVPA and VPA During Physical Education Units Focused on Direct Instruction and Tactical Games Models

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Louise Savory, Catherine Kerr*

Abstract

We investigated the moderate to vigorous physical activity (MVPA) and vigorous physical activity (VPA) levels of pupils during coeducational physical education units focused on direct instruction and tactical games models (TGM). Thirty-two children (11–12 years, 17 girls) were randomly assigned to either a direct instruction (control) or TGM (intervention) group. Children wore RT3 triaxial accelerometers over 6 physical education lessons focused on field hockey to measure time spent in MVPA and VPA objectively. The System for Observing Fitness Instruction Time (SOFIT) was also used during each lesson to examine pupil physical activity,

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lesson context, and teacher behaviors. Results from accelerometry show MVPA and VPA were significantly higher in the TGM class compared to the class taught using direct instruction. SOFIT lesson context data show the TGM teacher spent less time managing and more time in skill practice and game play. The results of this study indicate that a shift in games pedagogy to TGM, in which the central aspect is participation in modified/conditioned games, is more likely to provide pupils the opportunity to achieve current physical activity guidelines stipulated by the Department of Health (2011) and the Institute of Medicine (2013).

In physical education (PE) programs, there is a current overreliance on a direct instruction model (Metzler, 2011) in which constituent parts of sports and games are broken down and techniques are practiced in isolated, decontextualized conditions during which practice is unlikely to generalize to game conditions (Roberts & Fairclough, 2011). This approach has been criticized on a number of levels, which include a lack of opportunity for learner empowerment and creativity (Butler & McCahan, 2005), and its nonsituated nature that fails to prepare learners appropriately for the complexities of games (Kirk & Macdonald, 1998). Further criticisms lie in the role the teacher adopts within this approach, as they are the primary decision maker (Light, 2013).

As a way of expanding the focus of PE and its goals and purposes beyond a skills-first direct instruction model, Metzler (2011) proposed seven alternative pedagogical models including the Tactical Games Model (TGM). The TGM is an Americanized derivative of teaching games for understanding (TGfU; Bunker & Thorpe, 1982). In game-centered approaches (GCAs) such as TGfU and TGM, teachers begin the lesson by locating learning within modified games or game-like activities, therefore presenting the game first and before the introduction of skill practice. GCAs such as TGM therefore refute the notion that quality game play cannot emerge until the core techniques are mastered a priori (Oslin & Mitchell, 2006) and instead offer a way of linking techniques and tactics with the aim of promoting skillful and intelligent performance. These situated learning contexts further enable the teacher to step back, observe, and critically “emphasize questioning to stimulate thinking and interaction” (Light & Mooney, 2014, p. 2) to guide the pupils about the ways of overcoming the tactical problem set by the game

and help them understand why certain skills are needed to elevate game performance.

Researchers have suggested that given the focus of GCAs such as TGM on locating learning within small-sided and conditioned/modified games (Light & Mooney, 2014), this model of teaching PE may aid pupils in reaching current physical activity (PA) goals within PE lessons (McKenzie, 2012; Roberts & Fairclough, 2011; Van Acker, Carreiro Da Costa, De Bourdeaudhuij, Cardon, & Haerens, 2010). Current goals outlined by the Institute of Medicine (IOM, 2013) in the United States indicate pupils should engage in moderate to vigorous physical activity (MVPA) for at least 50% of the PE lesson, a figure that is not regularly met in most lessons, especially when games are not used as the organizing center for learning (Yelling, Penney, & Swaine, 2000). For example, Roberts and Fairclough (2011) found that English PE lessons centered on the direct instruction model resulted in high levels of pupil inactivity. In addition, they noted high levels of teacher management time, time centered on skill and drill practice, and a focus on full-sided versions of games (i.e., 11-vs.-11 soccer) during which some pupils were left to “sit out” on the sidelines. Roberts and Fairclough (2011) suggested that involvement in small-sided modified/conditioned games, a staple feature of GCAs such as the TGM (Mitchell, Oslin, & Griffin, 2006), could increase pupils’ levels of PA.

Of particular significance in this study is that current PA guidelines for children in countries such as the United Kingdom (UK) have recently been updated to emphasize the importance of including vigorous physical activity (VPA) on at least 3 days a week, in the context of a daily 60-min MVPA target (Department of Health, 2011). An additional accumulation of higher intensity PA (VPA and above) components during PE is highly significant given that VPA (or higher) is a stronger predictor of cardiorespiratory fitness (Aires et al., 2010; Dencker et al., 2008; Gutin, Yin, Humphries, & Batbeau, 2005), body fatness (Abbott & Davies, 2004; Parikh & Stratton, 2011; Ruiz et al., 2006), and vascular function (Hopkins et al., 2009) in children compared to moderate-intensity PA.

What This Study Adds

Given the growing concerns regarding low PA levels among children (Trost et al., 2002), more research is required into whether GCAs such as TGM, if taught appropriately, can realize the potential of aiding pupils in reaching current PA goals within PE (IOM,

2013; Van Acker et al., 2010; Yelling et al., 2000), especially compared to the direct instruction model. In addition, there is scope to examine how lessons taught using TGM affect levels of VPA. The purpose of this study was to investigate the MVPA and VPA levels of pupils during PE units focused on direct instruction and TGM. We hypothesized that pupils would gain greater levels of MVPA and VPA during the TGM unit compared to direct instruction.

Methods

Participants and Setting

This study was conducted in one coeducational state middle school in the East of England. Thirty-two students from two classes in the Year 7 age group (aged 11–12 years) participated in the study ($n = 17$ girls). Free school meal (FSM) eligibility was stated as 21.5% for the school, which is above the national average of 12.1% (Department for Education and Skills, 2005). In total, 543 students were enrolled at the school with 78.6% of students ethnicity stated as White British. All research procedures received approval from the university research committee, head teachers, and PE teachers from the schools who were involved in the study. Informed consent was obtained from parents/guardians as well as pupil assent using approved university and school system protocols.

Research Design

The aim of this study was to investigate the MVPA and VPA levels of pupils during PE units focused on direct instruction and TGM using a quasi-experimental pretest–posttest design. Harvey and Jarrett (2014) noted that in 10 of the 44 GCA studies published since 2006, this same quasi-experimental comparative approach was used, demonstrating that it is a popular research design in this specific area of research (e.g., Gray & Sproule, 2011).

Two coeducational classes from the school participated in the study; each class was randomly selected to be taught using the TGM intervention ($n = 16$, 8 girls) and one acting as a control class that was taught through the direct instruction model ($n = 16$, 9 girls). One male and one female teacher taught the control and intervention classes, respectively. Different teachers taught the control and TGM classes to avoid contamination of the data (i.e., aspects of the TGM intervention filtering into the control sessions). Twelve field hockey lessons were observed over 3 weeks (six control, six intervention).

Prior to data collection, a meeting was held with the teachers selected to plan lessons using either Mitchell et al.'s (2006) TGM and/or the direct instruction model as well as to overview model benchmarks (Metzler, 2011). The TGM teacher had experience of TGM as she had previously attended a university-based training course focused on TGM. The control group teacher was familiar with the direct instruction model and reported at this meeting that the direct instruction model mirrored his current approach to teaching games. Teachers were not aware, however, of the specific aims of the study. Additional descriptions of the direct instruction and TGM model sessions are provided in the next section.

Intervention

The weekly control and TGM sessions ran in parallel at the school. Teachers adapted their lesson objectives and delivery according to whether the TGM or the direct instruction model was used in the session. For the direct instruction model, teachers followed a "traditional" lesson structure outlined by Blomqvist, Luhthaten, and Laakso (2001) in which an introductory activity was followed by a skills phase focused on developing and improving skill technique, and this then progressed into a game in the latter part of the lesson. For example, in the hockey lesson (attacking play and maintaining possession), the teacher sent the pupils on a warm-up. They were then split into pairs and asked to make two lines. The task was to pass the hockey ball back and forth in pairs across the width of the hockey field in their pairs, finishing the drill with a shot on goal. A defender was then added to increase the difficulty of the attacking play and maintaining possession to develop this drill further. After a brief discussion about the drill, the teacher then placed the pupils in a game situation (11 vs. 11). The units of work were organized so the teacher centered learning in each lesson on one major technique/skill with a subsequent game situation.

The TGM teacher followed a three-part lesson recommended by Mitchell et al. (2006), which was focused on an introductory modified (representative and exaggerated) game, followed by a skills phase before returning to the initial modified game form. For example, in the third hockey session, the lesson was focused on attacking play and maintaining possession of the ball. The teacher sent the pupils on a warm-up and provided general knowledge about attacking play. The teacher then set up a 3-vs.-3 game with the condition that there was no tackling and if a team missed a shot that possession

would go to the opposing team. Pupils were then taken out of the game and a “dodging” practice was set up to enhance the skill of getting away from a player’s marker. Before, during, and after the dodging practice, the teacher asked guided questions in line with guidelines outlined by Mitchell et al. (2006) to aid learning (e.g., “How were you able to get closer to the goal?” “What dodges can you use to get away from your marker?” “What should other players on your team do when their teammate has the ball?”). The final part of the lesson involved the same conditioned game, this time, with the condition that each team could shoot from anywhere within the attacking half of the pitch.

Fidelity of Intervention

The TGM and control lessons were assessed using benchmarks to ensure that both approaches were implemented correctly and were not detrimental to learning outcomes (Metzler, 2011). A researcher and assistant were present at each PE lesson (control and TGM) to assess the teachers’ fidelity to model benchmarks. Lesson plans for both models were obtained prior to lesson implementation to ensure lessons followed the characteristics of each pedagogical model. For example, in the TGM condition, lesson plans were checked for deductive questions and that the teacher planned to begin each lesson with a game form to assess pupils’ knowledge. When necessary, the second author provided feedback on the teachers’ plans for both models.

Data Collection

RT3 triaxial accelerometry. The RT3 accelerometer was used to measure acceleration of movement across three axes (x, y, and z), and these data were subsequently converted to activity counts that have been successfully validated in a laboratory setting against oxygen uptake relative to body mass ($R = 0.87, p < 0.01$; see Rowlands, Thomas, Eston, & Topping, 2004). RT3 activity counts for each lesson were converted to metabolic equivalents using the cutoff points outlined by Rowlands et al. (2004). Frequencies were then calculated to establish time spent in MVPA. Activity thresholds (counts/min) were as follows: sedentary < 288 (< 1.5 METs), light 288–969 (1.5 METs), moderate 970–2332 (3 METs), and vigorous > 2333 (6 METs) activity (Rowlands et al., 2004). These were then reintegrated to match the 1-s epoch setting used for this study to minimize

underestimation of any short bouts of high-intensity exercise that may occur with longer duration epochs (Rowlands, 2007).

Children were assigned a specific number by the research staff. Body mass and stature were measured using Tanita bioelectrical impedance scales (BC-418MA) and a portable Leicester height stand, respectively, prior to pupils being issued an accelerometer that had been programmed with the specific details of each pupil. Accelerometers were placed in a clear plastic bag with the pupils' assigned number written on it. While in the changing rooms prior to each PE lesson, pupils located the bag with their assigned number, took the accelerometer that was connected to a waistband out of the bag, and placed it around their waist with the accelerometer on the right hip (Rowlands et al., 2004), wearing it for the duration of the lesson.

System for Observing Fitness Instruction Time. The System for Observing Fitness Instruction Time (SOFIT) is described as “a momentary time sampling and interval recording system designed specifically to quantify factors believed to promote health-related PA” (McKenzie, Sallis, & Nader, 1991, p. 196). SOFIT provided an additional measurement of PA levels alongside accelerometers and was also deemed useful as it provided important lesson information that helped link lesson contextual factors and teacher behavior to PA levels (Fairclough & Stratton, 2005c; Scruggs, Beveridge, & Clocksin, 2005). SOFIT is split into three phases (McKenzie et al., 1991).

The first phase involves the observation of pupils' PA levels. The activity level is coded against numbers 1–5, with 1 = lying down, 2 = sitting, 3 = standing, 4 = walking, and 5 = very active. The second coding phase involves coding the context of the lesson. Lesson context codes are as follows; M = general content (transition, break, management), P = knowledge content (physical fitness), K = general knowledge (rules, strategy, social behavior, technique), F = motor content fitness, S = skill practice, and G = game play. The final phase involves the coding of teacher behavior: P = promotes fitness, D = demonstrates fitness, I = instructs generally, M = manages, O = observes, T = off task.

The second author and an assistant were present for all observed SOFIT data collection (SOFIT data were collected for each lesson within the study). As per the SOFIT training manual (McKenzie, 2012), the PA levels of four randomly selected pupils (different each lesson) were observed on a rotational basis as well as the lesson contexts in which they occurred and teacher behaviors. These three elements were coded every 20 s using momentary time sampling as per standard SOFIT protocols (McKenzie, 2012).

Observer Reliability

Each lesson was analyzed using SOFIT, following an intensive training period. This consisted of the second author and research assistant coding protocols and analyzing other PE lessons with an experienced SOFIT observer. Observer agreements were calculated following the training, and observer agreements in excess of 85% were achieved for both observers with the expert before the study lessons were coded (van der Mars, 1989). Interobserver reliability checks were calculated for 20% of the lessons (randomly selected) and were greater than levels recommended in the SOFIT training manual (McKenzie, 2012). Interval-by-interval agreements between observers were 88% for activity level, 91% for lesson context, and 89% for teacher behavior, which exceeded both the minimum levels of agreement suggested by van der Mars (1989) and the minimum levels of reliability for SOFIT (McKenzie, 2012).

Data Analyses

RT3 triaxial accelerometry. RT3 data for each child were downloaded after every lesson. RT3 accelerometers that did not contain data because of either absence or neglecting to wear the device were excluded. Mean percentage of time spent in MVPA and VPA during PE over the six lessons overall and according to condition were calculated. Levene's tests were employed to establish if the parametric assumptions were met (Field, 2009). MVPA and VPA PE data for all schools met the assumptions of a parametric test. Data were therefore analyzed using an independent samples *t* test. Effects of gender were assessed using a 2×2 between groups ANOVA. Data were analyzed using SPSS 19.0 (SPSS, Chicago, IL).

System for Observing Fitness Instruction Time. SOFIT data were analyzed using the methods outlined in the SOFIT training manual (McKenzie, 2012). For example, time spent in MVPA and VPA was aggregated into percentages for each lesson, before mean percentages for the six lessons were calculated according to condition. Independent samples *t* tests were employed to establish significant differences between conditions, and Bonferroni correction factors were employed to each section of the analysis. For example, two behaviors were tested in the pupil PA level section, so the alpha level = $0.05/2 = 0.025$. In the lesson context and teacher behavior sections, the alpha level was set at 0.01 because of the multiple behaviors being analyzed.

Results

In this section, we overview the results from each of the data collection methods. The section begins with reference to data generated from the accelerometer before continuing on to results from the SOFIT analysis.

RT3 Triaxial Accelerometry

MVPA according to the RT3 accelerometry data was significantly higher in the intervention class (see Table 1), which related to 10.25 ± 3.40 and 18.49 ± 7.10 min of MVPA for the control and intervention classes, respectively. In addition, the VPA data were also significantly higher in the intervention class compared to the control (see Table 2). This was despite the large variation in MVPA and VPA, particularly within the intervention groups. No significant effects of gender were revealed for MVPA ($p = 0.81$) or VPA ($p = 0.48$) between groups, indicating gender is of no further theoretical interest.

Table 1

Descriptive Statistics: Overall Percentage of MVPA According to Condition

Activity	Condition	<i>n</i>	% MVPA (<i>M</i> ± <i>SD</i>)	<i>t</i>	Sig.
Hockey	CON	16	31.89 ± 9.82	-2.94	.006*
	INT	16	47.08 ± 18.19		

Note. CON = control; INT = intervention.

* $p < 0.01$.

Table 2

Descriptive Statistics: Overall Percentage of VPA According to Condition

Activity	Condition	<i>n</i>	% VPA (<i>M</i> ± <i>SD</i>)	<i>t</i>	Sig.
Hockey	CON	16	15.40 ± 7.03	-2.77	.009*
	INT	16	27.19 ± 15.47		

Note. CON = control; INT = intervention.

* $p < 0.01$.

System for Observing Fitness Instruction Time

Pupil physical activity level. Table 3 includes the average percentages of lesson time spent in MVPA and VPA and in different lesson contexts according to the SOFIT data. This analysis also demonstrated MVPA and VPA were higher in the intervention class, although this was nonsignificant (see Table 3). There was, however, greater variation in the SOFIT data in the TGM intervention group compared to the control.

Table 3
Percentage of SOFIT Analyses by Condition

Condition	CON (<i>M</i> ± <i>SD</i>)	INT (<i>M</i> ± <i>SD</i>)	<i>t</i>	Sig.
Student Behavior (% lesson time)				
MVPA	21.5 ± 5.7	33.9 ± 10.2	-2.08	0.09
VPA	4.1 ± 5.4	10.9 ± 9.6	-1.23	0.28
Lesson Context (% lesson time)				
Management	45.8 ± 9.4	31.3 ± 3.5	2.49	0.05
General Knowledge	12.2 ± 4.40	10.4 ± 6.2	0.45	0.66
Physical Fitness	0	0	0	0
Fitness Activity	3.4 ± 2.8	2.5 ± 4.1	0.32	0.76
Skill Practice	15.9 ± 15.3	26.6 ± 18.8	-0.84	0.44
Game Play	16.9 ± 21.8	29.5 ± 14.3	-0.86	0.43
Other	7.4 ± 10.1	0	1.25	0.27
Teacher Behavior (% lesson context)				
Promotes Fitness	0	0	0	0
Demonstrates Fitness	3.2 ± 2.6	0	2.08	0.09
General Instruction	31.5 ± 10.6	39.0 ± 13.9	-0.60	0.57
Manages	32.5 ± 11.9	26.2 ± 2.1	0.86	0.43
Observes	31.5 ± 7.2	25.9 ± 5.6	1.51	0.19
Other Task	1.7 ± 2.2	8.9 ± 6.2	-2.21	0.08

Note. CON = control; INT = intervention.

Lesson context. Lesson length was $M = 36.09$, $SD = 3.14$ min versus $M = 38.79$, $SD = 2.32$ min for control and intervention classes, respectively. There were no significant differences between the

control and intervention lessons in any of the lesson context variables. However, the teacher of the control group spent more time in management and other (i.e., free play) as well as less time in skill practice than the intervention teacher who also spent more time in game play.

Teacher behavior. There were no significant differences between the control and intervention lessons in any of the teacher behavior variables. However, management (see above), demonstrating fitness, and observation were slightly higher in the control group. Higher levels of instruction were noted in the TGM group as well as the percentage of time the teacher spent on other tasks such as “attending to events not related to his/her responsibilities to the class at hand” (McKenzie, 2012, p. 12). This was because the TGM teacher is a member of the school senior management team, and thus, the teacher was sometimes distracted away from the class for short periods to deal with specific incidents.

Discussion

The purpose of the study was to investigate the MVPA and VPA levels of pupils during coeducational PE units focused on direct instruction and TGM. We hypothesized that pupils would gain greater levels of both MVPA and VPA during TGM classes compared to those taught using direct instruction.

One major finding of this study was the contribution of PE lesson focused on TGM to the amount of time spent in VPA. On average, PE lessons were focused on TGM provided over 10 min of VPA according to the accelerometer data, which was significantly higher in the TGM group compared to the direct instruction group (see Table 2). This indicates that pupils in the TGM groups were more likely to achieve current PA guidelines that emphasize the importance of including VPA on at least 3 days a week, in the context of a daily 60 min of MVPA (Department of Health, 2011). In addition, the levels of VPA observed in the TGM group were higher than those reported in previous studies in which amounts of VPA during PE of 4.5 and 3.3 min were reported (Fairclough & Stratton, 2005c). Fairclough and Stratton (2005c) outlined that a reason for larger contributions of VPA in lessons focused on team games is the requirement to sustain large muscle groups engaged in PA for large proportions of time and hence its effect on the heart to beat faster to satisfy oxygen demand. Clearly, the lessons focused on the TGM provided lesson contexts within which pupils were provided with opportunities for

these high levels of VPA to occur (i.e., high levels of game play and skill practice than was observed in the control group).

In addition to increased levels of VPA, we found higher levels of accelerometer-based MVPA in the TGM condition compared to the control group, supporting previous research findings (e.g., Fairclough, 2003; Fairclough & Stratton, 2005b) that have shown team game activities to be one of the highest contributors to MVPA levels. These findings also replicate those of Yelling et al. (2000), who found that pupils in skill-dominated lessons gained lower levels of MVPA than pupils in games-focused lessons. However, MVPA levels in this study were slightly below the 50% recommendation of the IOM (2013) and were lower than MVPA levels reported by Van Acker et al. (2010) whereby pupils exceeded the 50% criterion in games-based lessons focused on korfbal. Differences between this study and Van Acker et al.'s may be a reason for these differences. First, Van Acker et al. focused on korfbal, whereas the game in this study was field hockey. Second, Van Acker et al. observed only one lesson, whereas we examined PA levels over multiple sessions, albeit we observed a smaller number of participants. Third, Van Acker et al. used heart telemetry and we used accelerometers and SOFIT to examine PA levels. Fairclough and Stratton (2005a) outlined that heart rate telemetry can be inaccurate because of increased heart rate from other variables such as stress. Consequently, researchers should consider using devices such as accelerometers in future studies as they can be used to measure actual PA participation and to measure PA continually over multiple lessons.

On a related note, we found that the observational PA assessment through SOFIT did not highlight significant differences in VPA or MVPA between the control and intervention classes, a finding that is contradictory to the objective accelerometry data. Fairclough and Stratton (2005a) outlined that SOFIT may provide different results to objectively measured PA because of the different dimensions of activity that each method is used to measure (i.e., RT3 accelerometry = movement and SOFIT = behavior). An additional suggestion for this difference may be that although SOFIT is a valid and reliable instrument, it may underestimate PA levels because it is based on a momentary time sampling method during which only the final second of a pupil's movement is captured every 20 s (McKenzie, 2012). Moreover, it is also largely dependent on the pupils who are monitored as only four pupils are monitored per class period, whereas all/most pupils within a class/group can be individually monitored using accelerometers.

Our opinion is that SOFIT was a useful data generation tool in this study as it provided important lesson information that linked lesson contexts and teacher behavior to VPA and MVPA levels (Fairclough & Stratton, 2005a; Scruggs et al., 2005). For example, the use of SOFIT demonstrated that the TGM teacher spent more time in game play *and* skill practice and much less time in management and other lesson contexts (i.e., free play) than the control group teacher. From the review of these data, it could be suggested that the greater amount of time in motor content therefore afforded the opportunity for a greater amount of VPA and MVPA and, arguably, the game–skill–game lesson structure of the TGM provided a more coherent lesson structure for the teacher of that unit. Our contention is that this, alongside the small sample size within this study that would be sensitive to individual variation, may explain why there was a larger variation in VPA and MVPA scores in the TGM group compared to the control group because the TGM group spent a greater amount of time in game play and skill learning (approximately 55% of the lesson; see Table 3) and thus had more opportunities to move and learn. In contrast, the control group spent more time being managed by the teacher as a whole group (nearly 46% of the lesson; see Table 3), with all pupils therefore spending more time doing the same thing (i.e., being inactive while listening to the teacher), thus not displaying the variation in scores of the TGM group. Roberts and Fairclough (2011) noted a high level of inactivity was associated with lessons focused on the direct instruction model, largely because of high levels of management and instruction as well as full-sided games. In contrast, McNeill, Fry, Wright, Tan, and Rossi (2008) have shown how the use of the games concept approach, a Singaporean derivative of a GCA, afforded pupils more time in game play in secondary school classes.

Capturing the teacher behavior data in this study was also important. It demonstrated the active supervision techniques of the TGM teacher compared to the direction instruction teacher. For example, the TGM teacher spent more time instructing and less time observing as the environment of the TGM lesson meant the TGM teacher was freed up to give feedback and ask questions by moving from game to game and practice to practice, thus reducing the time needed for knowledge and pupil management.

Notwithstanding this larger variation in VPA and MVPA scores for the TGM intervention group, it is promising that students participating in PE lessons focused on TGM, in which the central as-

pect is participation in modified/conditioned games, accumulated over 10 min of VPA, thus not necessitating alternative “prescribed” interventions (Basquet, Berthoin, & Van Praagh, 2002). Basquet et al. (2002) designed a specific intervention to enhance cardiorespiratory fitness during PE lessons that tended to lack an appreciation and value for the activities in and of themselves as they potentially lack “spontaneity and freshness” (Dewey, 1910, p. 217). In contrast, modified/conditioned games offer an opportunity for playfulness and the “unfolding of the subject on its own account” (Dewey, 1910, p. 219), thus making PE content, arguably, more meaningful and purposeful (Light, 2013).

This study had limitations that should be addressed in future research. First, a greater sample size and longer units of TGM and direct instruction would permit an answer to the question regarding the sustainability of the levels of MVPA and VPA within the TGM and/or would enable greater demarcation in MVPA and VPA between individuals. Clearly, the small sample size observed in this study is susceptible to greater variation from the mean, and a greater sample size in particular would ensure that results were not affected (either positively or negatively) by a small number of individual pupils. Second, although the effects of TGM on boys and girls were not significant in this study, researchers such as Van Acker et al. (2010) have suggested there may be differences. Further research may therefore be done to examine differences between boys and girls taught in coeducational and single-gender cohorts as only coeducational cohorts were examined in this study. Third, it may also be advisable to investigate the effects of different team and individual sport activities on MVPA and VPA levels (Fairclough & Stratton, 2005c) as most of the previous research, including this study, has been focused on team games being taught with TGM. Fourth, it would be of interest in future research to examine the effects of pupil motivation on the pupils’ propensity to engage in higher levels of MVPA and VPA and to investigate which motivational constructs demarcate pupils taught with TGM and direct instruction models (Gray, Sproule, & John Wang, 2008), as well as for which categories of games (i.e., net/wall, invasion) and which activities within these categories (see Mandigo, Holt, Anderson, & Sheppard, 2008). Finally, researchers may attempt to demarcate teacher behavior more specifically using the System for Observing the Teaching of Games in Physical Education (SOTG-PE; Roberts & Fairclough, 2012). This newly validated system was adapted from SOFIT and

additionally considers game-specific teacher interaction behaviors such as whether interactions were technically or tactically oriented and whether they were verbal or nonverbal. Using this system would therefore give more insight into the differences in teacher behaviors and provide researchers with more detailed data upon which to link changes in PA levels to the pedagogies associated with TGM that were not uncovered by using SOFIT in this study.

Conclusion

This study has provided much needed research to demonstrate the likely benefits of lessons focused on TGM to MVPA and, in particular, to VPA. Pupils in the TGM group had significantly higher MVPA and VPA levels compared to the control group, as measured by accelerometry, and were therefore more likely to meet current PA goals for MVPA and VPA stipulated by the Department of Health (2011) and the IOM (2013). This was, arguably, because of the greater amount of time the pupils were engaged in game play and skill practice compared to lessons focused on direct instruction during which higher levels of management were observed. Despite these positive findings, these results were subject to a large variation between participants and not corroborated by direct observation of PA through SOFIT, through which no significant differences were found between treatments.

Researchers should attempt to corroborate these findings over longer units in different games, especially with a greater sample of pupils (e.g., from multiple classes/schools), in coeducational and single-gender contexts. Researchers can additionally investigate pupils' motivation (see Mandigo et al., 2008) as a possible mediating factor in the links between teacher pedagogy and pupils' levels of PA with TGM units.

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METHODOLOGY

Quantitative Methodology: A Guide for Emerging Physical Education and Adapted Physical Education Researchers

Justin A. Haegele and Samuel R. Hodge

Abstract

Emerging professionals, particularly senior-level undergraduate and graduate students in kinesiology who have an interest in physical education for individuals with and without disabilities, should understand the basic assumptions of the quantitative research paradigm. Knowledge of basic assumptions is critical for conducting, analyzing, and presenting research of high quality in this arena. In this tutorial paper, we present information essential to understanding the assumptions undergirding the quantitative research paradigm including the logic of hypothesis testing and sampling. Moreover, we describe key aspects of true and quasi-experimental research designs commonly used in quantitative studies.

Research paradigms are undergirded by a set of assumptions (e.g., epistemology and ontology) that influence researchers' decisions and actions. Assumptions can be defined as a set of beliefs that guide the way in which researchers approach their investigations (Fraenkel, Wallen, & Hyun, 2012). Fraenkel et al. (2012) described assumptions as being "related to the views they [researchers] hold concerning the nature of reality, the relationship of the research to

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that which he or she is studying, the role of values in a study, and the process of research itself” (p. 427). Assumptions then guide the research endeavor, including the methods used and the questions asked (Hathaway, 1995). Emerging professionals such as upper level undergraduate and graduate students interested in research pertaining to physical education for individuals with and without disabilities should understand the basic assumptions of the quantitative paradigm for conducting, analyzing, and presenting research of high quality. This paper will serve as a convenient resource that can be distributed to emerging professionals to provide introductory research content. It is a user-friendly guide to unlock the mystery of many research methods textbooks and courses. Therefore, there were two purposes of this paper. The first purpose was to provide readers with information essential to understanding the assumptions undergirding the quantitative research paradigm including the logic of hypothesis testing and sampling. The second purpose was to describe key aspects of true and quasi-experimental research designs.

Basic Assumptions of the Quantitative Research Paradigm

The basic assumptions for each research paradigm are related to the philosophy under which the paradigm is situated. The quantitative research paradigm is based on the philosophy of positivism. *Positivism* is supported by an external realist ontology, in which it is assumed that a hard reality exists (Fraenkel et al., 2012; Pringle, 2000). The philosophy of positivism has influenced the quantitative research paradigm by providing several assumptions that guide researchers’ actions. According to Fraenkel et al. (2012), there are eight major assumptions of quantitative research (see Table 1). Researchers must consider each assumption when designing and implementing research using the quantitative paradigm.

Table 1
Major Assumptions of Quantitative Research

1. A hard reality exists, and it is the task of science to discover the nature of reality and how it works.
2. Research investigations can result in accurate statements about the way the world really is.
3. Researchers may remove themselves from what is being researched.
4. Facts are independent of the knower (the person with the knowledge) and can be known in an unbiased way.

Table 1 (cont.)

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5. Facts and values are distinct from one another.
 6. Proper research designs can lead to accurate conclusions about the nature of the world.
 7. The purpose of research is to explain and predict relationships.
 8. The goal of research is to develop laws that make prediction possible.
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Note. Derived from *How to Design and Evaluate Research in Education* (8th ed.), by J. R. Fraenkel, N. E. Wallen, and H. H. Hyun, 2012, New York, NY: McGraw-Hill.

In basic terms, a positivist's view of the role of science is to discover the nature of this reality and determine how it works (Fraenkel et al., 2012). Furthermore, a positivist epistemology claims to be free of value and not influenced by social context (Pringle, 2000). Positivists believe their understanding of knowledge can be generalized to other individuals across different environments and time. Positivism states the world is deterministic, meaning all events that occur in the world are a result of a cause-and-effect relationship (Trochim & Donnelly, 2006). An essential aspect of this paradigm is the logic of hypothesis testing.

The Logic of Hypothesis Testing

Hypothesis testing is the formal procedure used by researchers utilizing the group design research paradigm to accept or reject statistical hypotheses. Hypothesis testing is based on the mathematic concept of probability, which represents the likelihood of an event occurring. A research hypothesis is the predicted outcome or the expected results from a study (Fraenkel et al., 2012; Thomas, Nelson, & Silverman, 2005). This anticipated result may be derived from previous literature, a theoretical framework, or a researcher's previous experiences (Gay, Mills, & Airasian, 2006; Thomas et al., 2005). The formulation of a research hypothesis is critical to the beginning of the research process, as every aspect of a study is affected by the hypothesis including the participants selected, design of the study, and data analysis strategy (Gay et al., 2006). In contrast to the research hypothesis, the null hypothesis states there was no change in the participants' behavior after the researcher introduced the intervention (Fraenkel et al., 2012). In null hypothesis testing, the researcher uses deductive reasoning to ensure the truth of conclusions is irrefutable (Wilkinson, 2013). A critical feature of a re-

search hypothesis and null hypothesis is they must be testable, providing a way the claim can be either supported or refuted (Thomas et al., 2005).

To further illustrate the difference between research and null hypotheses, consider a study by Cervantes and Porretta (2013), who sought to determine the effect of a social cognitive theory–based after-school program on the leisure-time physical activity participation of adolescents with visual impairments. For this study, a research hypothesis may state the expected results of the study would be that adolescents with visual impairments exhibit more leisure-time physical activity participation when introduced to a social cognitive theory–based after-school program. On the contrary, the null hypothesis would indicate adolescents with visual impairments do not exhibit a change in leisure-time physical activity participation when introduced to a social cognitive theory–based after-school program.

Several misconceptions exist about hypothesis testing (Thomas et al., 2005). One common misconception about hypothesis testing is that researchers seek to determine whether a research hypothesis is accurate. Statistics cannot prove a research hypothesis is correct (Thomas et al., 2005). Rather, researchers seek to determine whether the hypothesis is supported by data (Gay et al., 2006). Another common misconception is that researchers test their research hypothesis. Instead, it is always the null hypothesis that is tested. All that statistics do is inform the researcher to either reject or fail to reject the null hypothesis (Thomas et al., 2005).

After the *research* and *null hypotheses* are stated, the researcher will then test the null hypothesis to assess the probability of the sample result if the null hypothesis were true (Fraenkel et al., 2012). In other words, the researcher looks to determine the probability of whether the data obtained through the study could exist if the null hypothesis were true. To do so, researchers decide what statistics are relevant for the particular data set and specific hypothesis. Using the statistical procedure(s) chosen, researchers analyze the data to determine the probability of obtaining the sample results if the null hypothesis were true. The last step in hypothesis testing is to either accept or reject the null hypothesis. Researchers base this decision on the level of significance of the result. If the probability of obtaining the sample results with the null hypothesis being true is small, the null hypothesis is rejected. If the probability of obtaining the sample results with the null hypothesis being true is large, the

research hypothesis is not supported. But what is a large or small probability?

In most quantitative studies, including group designs commonly used in physical education research, a standard significance level is .05. For example, Vigo-Valentín, Bush, and Hodge (2014) examined the physical activity behaviors of 637 adolescents attending middle and high schools in Puerto Rico. They set the significance (called *alpha*, α) level a priori at 0.05 and reported, among other findings, that middle school students participated significantly, $F(1) = 4.73$, $p = .03$, more in moderate physical activities than did high school students. For this finding, the researchers would reject the null hypothesis of no difference between middle and high school students' physical activity participation because the p value was below .05. When researchers reject a null hypothesis at the .05 significance level, they are saying the probability of obtaining that outcome with the null hypothesis being true is only 5% (Fraenkel et al., 2012). This also means the probability of obtaining that outcome with the null hypothesis being false (or the research hypothesis being supported) is 95%. In most cases, a 95% probability of a research hypothesis being supported is acceptable and appropriate. However, this opens the door for researchers to make errors, as 95% does not account for all possibility. One error, called a type I error, occurs if a researcher rejects a null hypothesis that is true, or a false positive. This happens when the 5% chance of being correct is, in fact, correct. A second error is called a type II error, the magnitude of which is determined by *beta* (β ; Thomas et al., 2005). This error represents when a researcher fails to reject a null hypothesis that is false. A type II error is also known as a false negative and can result from a researcher who mistakenly believes there was no difference between treatment groups ($p < .05$), even though the difference was statistically significant. Beta error (or type II error) indicates the researcher's hypothesis was likely true, despite the decision to reject it and accept the null hypothesis (Levin, 1983). Thomas et al. (2005) explained the relationship between alpha and beta, in that "as alpha is set increasingly smaller, beta becomes larger" (p. 115). Figure 1 shows the four possibilities for hypothesis testing and error.

	Null hypothesis true	Null hypothesis false
Accepting	Correct	Type II Error
Rejecting	Type I Error	Correct

Figure 1. Hypothesis decision error table. Adapted from *How to Design and Evaluate Research in Education* (8th ed.), by J. R. Fraenkel, N. E. Wallen, and H. H. Hyun, 2012, New York, NY: McGraw-Hill, p. 233. Copyright 2012 by McGraw-Hill.

The logic of hypothesis testing can be summarized in six steps (Fraenkel et al., 2012). The sequence entails (1) stating a research hypothesis; (2) stating a null hypothesis; (3) determining the statistics that are pertinent to the hypothesis and type(s) of data (e.g., ordinal, interval); (4) determining the probability of obtaining the sample results if the null hypothesis is true; (5) rejecting the null hypothesis if the probability is small, hence confirming the research hypothesis; and (6) not rejecting the null hypothesis if the probability is large, hence not affirming the research hypothesis (Fraenkel et al., 2012). A visual display of this sequence is provided in Figure 2. Hypothesis testing requires the random or nonrandom selection of one or more samples for making inferences (i.e., statistical generalizations) about the target population. For example, Hodge, Davis, Woodard, and Sherrill (2002) used hypothesis testing to compare the effects of two practicum types on physical education teacher education students' attitudes and perceived competence toward teaching students with disabilities. The two samples were students enrolled in either Group A (off-campus practicums) or Group B (on-campus practicums).

Sampling Strategies

A *sample* is a group of participants on which a study is conducted (Thomas et al., 2005). The larger group of people whom the researcher hopes to infer the findings from the study is referred to as the population. One of the most critical elements of a study is selecting the individuals who will participate (Fraenkel et al., 2012). The process of selecting participants for a research study from the population level to a sample is called sampling.

The first task in sampling is defining a target population of interest. At this step, the researcher needs to determine to which group he or she expects for the results of the study to apply. Decisions regard-

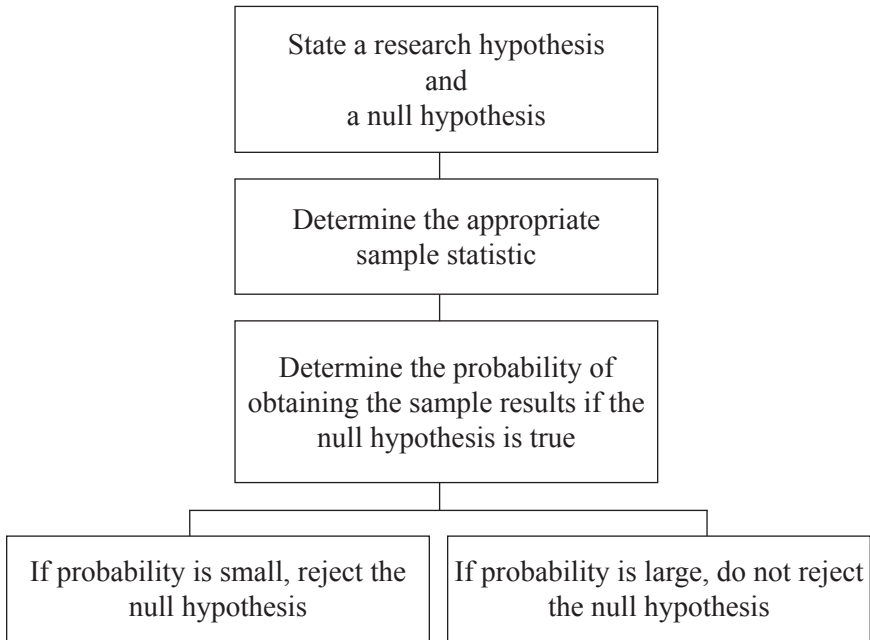


Figure 2. Summary of hypothesis testing logic. Adapted from *How to Design and Evaluate Research in Education* (8th ed.), by J. R. Fraenkel, N. E. Wallen, and H. H. Hyun, 2012, New York, NY: McGraw-Hill, pp. 228–229. Copyright 2012 by McGraw-Hill.

ing from which population to sample are typically derived from the research question. A population can be a large group of people, such as the residents of New York City, or a small and direct population, such as third grade students in Ms. Cha’s class in Gahanna Elementary School. The population would then represent all of the people who make up that specific description.

A researcher may use several strategies to select a sample from the targeted population. Sampling strategies are typically categorized into either random sampling or nonrandom sampling. Random sampling is when every member of a population has an equal chance of being selected into the sample (Fraenkel et al., 2012). The basic idea with random sampling is the group of individuals who are selected for the sample will have many of the same attributes or characteristics as normally distributed in the population from which it was drawn (Fraenkel et al., 2012). This is especially effective when the sample is large. On the other hand, nonrandom sampling is char-

acterized by all individuals in the population not having the same opportunity to be included in the sample. In nonrandom sampling, the researcher may establish additional criteria that he or she wants the participants to meet to be included in the sample. In this way, not all individuals in the population have the same chance (and some may have no chance) of being included in the sample. Recent document analyses and literature reviews of research in physical education for persons with disabilities indicate nonrandom sampling procedures were used in the majority of studies, categorized as purposive, convenience, or recruited samples (Haegele & Porretta, 2015a; Karkalatsi, Skordilis, Evaggelinou, Grammatopoulou, & Spanaki, 2012).

Researchers may use many random and nonrandom sampling strategies to obtain samples for research purposes. For this tutorial, we discuss briefly the features of six sampling strategies used commonly in quantitative research studies: (a) *simple random*, (b) *stratified random*, (c) *systematic*, (d) *cluster*, (e) *convenience* or *accidental*, and (f) *purposive* (Gay et al., 1996; Thomas et al., 2005).

Simple Random Sampling

Simple random sampling is a random sampling procedure in which each individual in the population has an equal chance of being included in the sample. Fraenkel et al. (2012) suggested simple random sampling may be the best method to obtain a representative sample of the population, especially for large samples. In this strategy, a table of random numbers is used to ensure every member has an equal and independent chance to be included (Fraenkel et al., 2012; Thomas et al., 2005). A table of random numbers can be a large list of numbers with no predetermined order or pattern. The table can be used in several ways to select participants. Fraenkel et al. (2012) suggested creating a series of random six digit numbers. From there, they would use the first few digits from each number to decide on the identified individuals within a population for the sample. For example, a researcher needs to choose 50 participants from a population of 500. The researcher would assign numbers to each participant (i.e., 1 to 500) and then go through the table of random numbers and use the first three digits of each number to choose the participants. If a number was 324053, participant 324 would be included in the study. If numbers were too high (i.e., 650), the researcher would skip to the next number.

Once again, the purpose of simple random sampling is to select a random sample that represents the larger population (Thomas et

al., 2005). This strategy has a few disadvantages. First, it is not an easy sampling strategy to use because each member of the population must be identified (Fraenkel et al., 2012). In large populations (e.g., inhabitants of states), this is not possible. Second, although school-based research is essential to physical education research, randomly selecting participants in schools is typically problematic. It is not likely school administrators will allow researchers to break apart classes in the name of scientific inquiry. Third, simple random sampling should not be used if researchers wish to be sure that certain demographic groups are included in the sample in the same proportion as they are in the population (Fraenkel et al., 2012). This can be an issue with small sample sizes. For this objective, researchers should use stratified random sampling or purposive sampling.

Stratified Random

Stratified random sampling is a sampling procedure in which the population is divided based on a chosen characteristic prior to sampling (Thomas et al., 2005). Participants who are included in a specified demography, or strata, are selected in the same proportion as they exist in the population, or the desired proportion for a study.

The following steps would be used in stratified random sampling. First, the researcher identifies the target population. Second, the researcher determines what characteristic he or she wants to stratify the sample based on and determine what percentage of that characteristic is present in the population. Next, the researcher creates a table of random numbers, which will include strata of each desired characteristic. Finally, the researcher uses the table of random numbers to select the sample, being sure to include a predetermined percentage of participants from each of the desired strata.

Stratified random sampling may be particularly useful in survey research, as researchers typically want to find a large representative sample (Thomas et al., 2005). For example, in conducting an online survey study, Beamer and Yun (2014) used a stratified national random sample of 3,000 public schools to examine the beliefs and self-reported behaviors of 233 general physical education teachers from 12 states across six geographic regions (two states per region sampled randomly) in the United States. The strata were states across regions. Advantages of stratified random sampling are it increases the likelihood of obtaining a representative sample and almost ensures important attributes of individuals are included in the same proportion as they naturally exist (Fraenkel et al., 2012). Perhaps the

biggest disadvantage of stratified random sampling is the amount of effort it takes the researcher to perform stratified random sampling correctly (Fraenkel et al., 2012).

Systematic

Systematic sampling is categorized as a nonrandom sampling method because all members of the population do not have an equal chance to be selected (Fraenkel et al., 2012; Gay et al., 2006). This method can be used when the population from which the researcher is sampling is too large and assigning a numeric identification number would be too time consuming (Thomas et al., 2005). Using systematic sampling methods, the researcher would select every n th (e.g., 12th, 7th, 122nd) individual in a list of potential participants. A method that is typically paired with systematic sampling is using a random start. A random start includes randomly selecting a starting point in the first few participants and then selecting every n th participant from there.

Several other terms are associated with systematic sampling. First, a sampling interval is the distance in a list between each of the participants selected for the sample (Fraenkel et al., 2012). If a researcher chooses a participant every 10th person, the sampling interval would be 10. Second, a sampling ratio is the proportion of the population that is included in the sample. If the population is 1,000 individuals and the researcher chooses 100 participants (one out of every 10th person), the ratio would be .10.

A benefit of systematic sampling is the selection process is simple (Gay et al., 2006). However, it is important for the researcher to inspect the list of potential participants carefully prior to sampling using a systematic sampling technique. If researchers are in an educational setting, it may not be uncommon to receive lists in order of grade point average (GPA), homeroom, or seat order in classes. Researchers should inspect the list for any pattern that could accidentally coincide with the sampling interval (Fraenkel et al., 2012). This type of bias is called periodicity. For example, Leites, Bastos, and Bastos (2013) used a systematic sampling procedure to obtain a representative sample ($n = 967$) of adolescents from South Brazil to estimate the prevalence of insufficient physical activity levels.

Cluster

Cluster random sampling is a technique researchers use when simple random and stratified random sampling strategies are not

available options. This can be when a list of all of the members of a population of interest is unavailable or if participants have predetermined groups, such as attempting to conduct research in schools. Occasionally, when it is not possible to sample individual participants in a school, it may be more likely to sample an entire intact class. The selection of classes, or clusters, instead of individual participants is called cluster random sampling (Fraenkel et al., 2012). For example, Hogan, McLellan, and Bauman (2000) randomly sampled one class from a collection of 115 target schools to determine the health promotion needs of students with self-reported disabilities in New South Wales.

Cluster random sampling is similar to simple random sampling except the researcher selects groups instead of individuals (Fraenkel et al., 2012). Benefits of cluster random sampling include it (a) is available to use when simple random sampling is impossible because of group contexts, (b) allows for research to be conducted in schools, and (c) can be less time consuming than simple random sampling (Fraenkel et al., 2012). However, with cluster random sampling, the chance is greater that the sample is not representative of the population.

Convenience or Accidental Sample

Researchers prefer random samples or systematic samples because of the high likelihood of representing the population accurately. However, it is not always possible to obtain a random or systematic sample of participants. In cases like this, researchers may recruit a convenience sample. *Convenience sampling* is selecting a group of individuals based on them being available for the study (Fraenkel et al., 2012). For example, Obrusnikova and Dillon (2011) used a convenience sampling method for their study. They contacted licensed physical education teachers through a list of e-mail addresses of individuals who had recently passed the Adapted Physical Education National Standards examination to complete survey questionnaires about challenges in teaching children with autism spectrum disorders (Obrusnikova & Dillon, 2011). This sampling strategy has the major disadvantage that there will likely be a bias in the sample. When using convenience sampling methods, researchers will likely choose participants who are either the closest in distance or the most accessible.

It is unlikely for convenience samples to be representative of the entire target population (Fraenkel et al., 2012). In this case, re-

searchers should be especially diligent in providing full descriptions of the participants in the study. As noted earlier, nonrandom sampling procedures, such as convenience or accidental sampling, are common in physical activity research, particularly pertaining to individuals with disabilities (Haegele, Lee, & Porretta, 2015; Haegele & Porretta, 2015a; Karkalets et al., 2012). This may be because of the difficulty in obtaining a sample of individuals with disabilities for studies, so researchers recruit individuals who are most available to them.

Purposive

Purposive sampling is another nonrandom sampling procedure in which researchers use their judgment to select a sample that they want. This is different than convenience sampling as researchers do not simply choose whoever is available for the study (Fraenkel et al., 2012). Rather, using purposive sampling, the researcher deliberately identifies criteria for selecting the sample (Gay et al., 2006). For example, in previous work, researchers (Haegele & Porretta, 2015b) have used a purposive sampling procedure for a study to seek validation information for audio pedometers. In this study, participants were selected based on residential status at a school for the blind, their ability to wear two pedometers simultaneously, and not having an ambulation-related disability (Haegele & Porretta, 2015b).

A primary strength of purposive sampling is the researchers can target attributes within a specific population and obtain a sample of individuals with those attributes. This strategy is especially beneficial when targeting populations that may be unique to the larger population because the researcher can pinpoint relevant attributes during sampling. However, purposive sampling has several weaknesses as well. Specifically, researchers may make errors in determining selection criteria of the sample or misestimate the representativeness of the sample that they select (Fraenkel et al., 2012; Gay et al., 2006). A further disadvantage of purposive sampling is that it limits the number and type of inferential statistics that are available to analyze the data.

Experimental Research Designs

The objective of experimental research is to establish cause-and-effect relationships (Thomas et al., 2005). To do so, the researcher manipulates the independent variable to judge its effect on the dependent variable (Fraenkel et al., 2012; Thomas et al., 2005). This

action allows experimental researchers to go beyond descriptive and correlational information and determine what causes the phenomenon to occur (Fraenkel et al., 2012). To establish a cause-and-effect relationship (a) the cause must precede the effect in time, (b) the cause and effect must be correlated with each other, and (c) the relationship between cause and effect cannot be explained by another variable (Thomas et al., 2005). Another characteristic of experimental designs is they typically involve at least two groups of participants. One group acts as the experimental group, who receives the intervention, and the other group acts as the comparison group (may receive an alternative intervention) or as the control group, who does not receive the intervention (Fraenkel et al., 2012).

In experimental research, one of the most important concepts is the control, or elimination or minimization, of threats to the validity of the results. Threats to validity can effect both *internal validity* (i.e., the degree to which observed differences on the dependent variable can be attributed directly to the independent variable) and *external validity* (i.e., the degree to which results are generalizable). To gain high internal validity, the researchers must control for all variables to eliminate other explanations for change (Thomas et al., 2005). When the researcher does this, though, the study will lose degrees of external validity because of the lack of ecological resemblance. Common threats to internal validity include (a) history, (b) maturation of participants, (c) testing effects, (d) instrumentation, (e) statistical regression, (f) selection bias, (g) experimental mortality, (h) selection–maturation interaction, and (i) expectancy (Thomas et al., 2005). One way to control for threats to internal validity is through randomization, which is discussed briefly in the next section on true experimental research. Placebos, blind, and double-blind studies are also strategies useful in controlling for threats to internal validity, but are not commonly used in physical education research. Some threats to internal validity, such as experimental mortality, are uncontrollable.

As with internal validity, external validity has several threats that can affect the ability for researchers to generalize results to other participants or settings. External validity threats include (a) reactive or interactive effects of testing, (b) interaction of selection bias and the experimental treatment, (c) reactive effects of experimental arrangements, and (d) multiple treatment interference (Thomas et al., 2005). External validity is typically controlled by selecting a sample

of participants who provide an equitable representation of the larger population (Thomas et al., 2005).

The way in which researchers choose to control variables and which variables they value in controlling affect the research designs they use. In experimental research, two broad categories are true experimental designs and quasi-experimental designs. In the following sections, we describe essential components of true experimental and quasi-experimental research designs.

True Experimental Research

Research designs are typically considered to be *true experimental* whenever they include randomly formed experimental and comparison or control groups, which allow the researcher to assume they were equivalent at the outset of the study (Thomas et al., 2005). Key aspects of random assignment include (a) it must occur prior to the experiment; (b) it must be a process of assigning individuals to groups, not an outcome of distribution; and (c) the groups that are formed are different only from chance (Fraenkel et al., 2012). The power of random assignment is that it controls for extraneous variables of which the researcher is or is not aware (Fraenkel et al., 2012). Random assignment controls for threats to validity including history, maturation, testing, statistical regression, selection bias, and selection–maturation interaction (Thomas et al., 2005).

Although true experimental research may be viewed as the most powerful style of group design research, it is not common in physical education research settings. One reason for this is researchers cannot randomize participants in an applied setting. In addition, the chance of providing a harmful treatment, or withholding a powerful treatment, causes ethical concerns in school-based settings. A third reason, pertaining more specifically to the education of individuals with disabilities, is the difficulty in acquiring a large enough sample of homogeneous participants with a specific diagnosis to conduct a study. These reasons lean more support for the use of quasi-experimental research (or single-subject designs) to evaluate treatments for students in schools.

Quasi-Experimental Research

The prefix *quasi* means “having some resemblance to a given thing” (Gove, 1971, p. 1861). Based on this definition, *quasi-experimental* research has some resemblance of true experimental research. According to Thomas et al. (2005), not all group design

research fits clearly into the category of true experimental design. In quasi-experimental designs, the design of a study is fit into the settings more likely to resemble real-world applications and as many threats to validity as possible are still being controlled (Thomas et al., 2005).

Because most real-world applications (e.g., physical education classes, schools in general) do not allow researchers to assign participants to groups randomly, randomization is usually the aspect of true experimental designs that is lost in quasi-experimental designs. When random assignment is not possible, researchers must rely on other techniques for controlling threats to validity (Gay et al., 2006). One such quasi-experimental design is the nonequivalent control group design. This design is similar to the experimental pretest–posttest design. However, rather than randomly assigning individuals to groups, researchers assign intact groups to different treatments (Gay et al., 2006). When assigning intact groups to different treatments, researchers should remember the appropriate unit of analysis is almost always the group, rather than the individual participants (Silverman & Solmon, 1998). Therefore, a larger number of groups may be needed to obtain sufficient power while analyzing data (Thomas et al., 2005). Other examples of quasi-experimental designs include counterbalanced, ex post facto, time series, and matching-only designs. The researcher may never control for internal validity as well in quasi-experimental designs as in true experimental designs, but quasi-experimental designs allow researchers to conduct investigations when true experimental designs are not feasible (Thomas et al., 2005). However, because the control and treatment groups may be different in unknowable ways, several alternative hypotheses may be stated to explain observed results in addition to experimental manipulation.

Summary and Implications

To conduct, analyze, and present research of high quality in the quantitative paradigm, researchers must have an understanding of basic assumptions. Therefore, it is essential for emerging professionals who have an interest in research pertaining to physical education for individuals with and without disabilities to be able to access this knowledge. In this tutorial, we have provided readers with basic information for understanding the quantitative research paradigm. This information has included the logic of hypothesis testing and sampling and key aspects of true and quasi-experimental research

designs commonly used in quantitative studies. In addition, we have provided relevant examples of the use of these components from the physical education and adapted physical education literature. This tutorial should help readers better understand basic concepts and principles of quantitative research methodology for the conduct of school-based research in physical education.

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PEDAGOGY

The Socratic Gymnasium: Learning Lessons of Life Through Physical Education

Klara Gubacs-Collins

Abstract

What constitutes appropriate practice in physical education? NASPE suggests the outcome of a physical education program should be that adolescents have gained the skills and knowledge to be physically active for a lifetime. Furthermore, a physically educated person consistently demonstrates responsible personal and social behavior in physical activity settings. The question thus becomes, how do physical education teachers accommodate all of these aspects of appropriate practice into a single unified integrated system that includes equal emphasis on the physical, cognitive, and affective aspects of physical education? My contention is that the answer lies in what I shall refer to as the Socratic gymnasium. The main pillars of the Socratic gymnasium are the combined utilization of a tactical games approach (TGA), sport education (SE), and teaching personal and social responsibility (TPSR), all of which are constructivist instructional models.

The National Association for Sport and Physical Education (NASPE, 2014) in regard to *appropriate practice* suggests “the outcome of a developmentally and instructionally appropriate physical education (PE) program is an individual who has the knowledge,

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skills and confidence to become and remain physically active for a lifetime” (p. 3). Also, according to NASPE,

Appropriate instructional practices in physical education are those that recognize children’s development and changing movement abilities, as well as their individual differences. Children’s past motor skill, sport, cognitive and social experiences also are considered in lesson and program design and delivery. (p. 3)

Furthermore, a physically educated person consistently demonstrates responsible personal and social behavior in physical activity settings. Finally, NASPE suggests, “Appropriate instruction in physical education incorporates the best-known practices, derived from both research and teaching experiences, into a pattern of instruction that maximizes opportunities for learning and success for all children” (p. 3). The expectation is that a person is accountable for responsible behavior and that this responsibility and accountability transfers from the field or gymnasium into the activities of everyday life. To put it another way, it is as important for students to recognize and understand fully the significance of physical activity in maintaining a healthy, active lifestyle as it is for students to achieve competence in a variety of movement activities. I believe that physical educators are uniquely positioned to perform a critical role in transmitting knowledge about physical activity that transcends the moment and that will aid and inform the students as they react to the demands of everyday life.

The question thus becomes, where and how will PE teachers learn to accommodate all of these aspects of appropriate practice into a single unified integrated system that includes equal emphasis on the physical, cognitive, and affective aspects of PE? My contention is that the answer lies in what I shall refer to as the Socratic gymnasium in physical education teacher education (PETE) games education. Thus, in this paper, I will introduce a teaching, curriculum, and assessment model that I implemented in a PETE program following the premise of the student-centered constructivist Socratic dialogue. I will discuss the importance and venue of redefining the purpose of PETE pedagogy from a content and teacher-centered traditional model to a student-centered constructivist model. For this purpose, I will introduce the main pillars of a student-centered constructivist teaching model in PETE games education as well as

a brief lesson and teaching unit in volleyball in which the Socratic teaching dialogue is followed.

Behaviorism to Constructivism

A significant change occurred in the content of PE when the curriculum shifted from an emphasis on gymnastics and exercise to an approach emphasizing sports and games (Swanson & Spears, 1995). As games came to play an increasingly large role in PE programs in the United States, the typical lesson model consisted of first providing explanation or demonstration of a skill, followed by practicing the named skill, and at the conclusion of the PE unit participating in game play. This remains the dominant model for instruction in many PETE and K–12 programs to this day, representing a behaviorist learning theory. Behaviorism has a long custom in PE literature dating back to Siedentop and Rushall's (1972) introduction of a behavioral model for motor skill acquisition. From this point, behaviorism became a frequently used theoretical framework within PE and sport studies (Lee, 1993; Ward & Barrett, 2002). According to behaviorist principles, the teacher's job is to transmit knowledge. As B. F. Skinner, one of the main early proponents of behaviorism, theorized, a job should be broken down into tasks, and students learn best in a linear step-by-step format (Entwistle, 1981). Behaviorism has formed the dominant view of learning for much of the 20th century and continues to have a strong influence in PE (Light, 2008). PE teachers' practice is typically based on assumptions about learning that are deeply embedded in Western culture, and it follows the hypothesis that learning is an explicitly linear and measurable process of internalizing knowledge (Davis, Sumara, & Luce-Kapler, 2000). For the purpose of this article, this model is referred to as the traditional behaviorist approach to teaching games in PE.

Influenced by the original observations of Bunker and Thorpe (1986), throughout the last two decades, PE theorists have begun to question the effectiveness of this model and have suggested that traditional behaviorist teaching methods concentrating only on specific motor responses (techniques) fail to account for the contextual and social nature of games. Games knowledge refers not only to the ability to execute complex motor skills but also to decisions concerning the appropriate use of the skill within the context of the game situation (McPherson & French, 1991). If a volleyball player demonstrates the "ideal form" of serving the ball but cannot react effectively to the set up of the opposition during a game, the goal

of the game will not be achieved. To become skilled in playing a game, the performer must develop the ability to monitor and evaluate the game situation, identify response options, and then select the most appropriate response for a particular situation (McPherson & French, 1991).

In addition, it has also been discussed (Rink, 2010; Stolz & Pill, 2012) that a problem with the traditional approach to teaching games and sport in PE is an overemphasis on the psychomotor domain to the detriment of the cognitive and affective domains of learning. Finally, in the traditional approach skills are taught without social and game context (Kirk, 2010; O'Connor, 2006; Rovegno, 1995), and herein rests one of the most distinctive differences between the traditional and constructivist teaching approaches. Therefore, there has to be an attempt to rebalance the unequal emphasis on the psychomotor domain by developing thinking students and players who are also well versed in the affective aspects of physical activity, such as the process of winning and losing and conflict resolution. The failure of the traditional and the need for a more constructivist approach to teaching games may also have to do with the findings that traditional school PE is viewed as irrelevant or boring for adolescents (Ennis, 1999; McKenzie, Alcaraz, & Sallis, 1994; Rikard & Banville, 2006; Smith & Parr, 2007; Tinning & Fitzclarence, 1992).

As a response to the above issues, I contend that a logical step would be to implement a more student-centered constructivist model in PE in which students “engage in activities that require higher level of thinking and reflective processes” (Richard & Wallian, 2005, p. 21). Consequently, in a Socratic gymnasium the instruction will be properly aligned with a constructivist and student-centered understanding of the nature of learning and the constructivist and student-centered design for teaching. As Biggs (1996) indicated,

A working version of constructivism can be integrated with instructional design at three crucial points: the curriculum or unit objectives are clearly stated in terms of content specific levels of understanding that imply appropriate performances, the teaching methods require students to be placed in contexts that will likely elicit those performances, and the assessment tasks address those same performances. (p. 361)

With these crucial points in mind, it has been suggested that in all of the main pillars of a Socratic gymnasium—sport education

(SE), teaching personal and social responsibility (TPSR), and the tactical games model (TGA), derived from the teaching games for understanding (TGfU) model—constructivist pedagogies are used in which students begin the learning experience with their previous learning experiences intact (Griffin & Butler, 2005; Kirk & Macdonald, 1998; Rovegno & Dolly, 2009)

These methods are situated to encourage student engagement with content intellectually, socially, and kinesthetically through active participation in solving tactical, personal, and technical problems. Students are also encouraged to collaborate with others and to use prior knowledge as they interact with new knowledge to develop more complex understandings about a given topic from an affective, cognitive, and psychomotor perspective (Griffin & Butler, 2005). Furthermore, these curriculum models require students to construct their own knowledge through social interaction with classmates (Rovegno & Dolly, 2009). An active learning process is emphasized in all three approaches, and according to Kirk and Macdonald (1998), this learning is “situated in social and cultural context and is influenced by these contexts” (p. 376). Specifically, Kirk and Macdonald suggested these models are practices in PE in which existing communities of practice are modeled, thereby strengthening their constructivist orientation.

This constructivist student-centered characteristic is the significant common building block of each model that, in combination, shapes the Socratic gymnasium. My contention is that bringing these models together under the aegis of the Socratic gymnasium can produce quality constructivist PE. The combined applications of these models in a Socratic gymnasium produce a safe learning place where teachers and students pose questions that are researched and answered by both in a community of learners. When used in combination, these three approaches have the potential to improve significantly how PE games education is taught in PETE and at K–12 levels.

Several physical educators have already successfully undertaken the difficult task of designing and implementing one or two of these three models in their PE settings. For example, Hastie and Buchanan (2000) combined SE and TPSR in their study of a 26-lesson teaching unit, and they concluded:

To summarise the experience, then, it could be stated that using the goal levels served to improve the performance of

the players in the responsibility aspects of Sport Education. That is, the personal well-being aspects of TPSR served to improve the quality of the Sport Education season. (p. 34)

Hastie and Buchanan considered that the merging of SE and TPSR led to a hybrid model that they entitled “Empowering Sport” (p. 34). Empowering Sport was described as “a sport-based model that foregrounded specific features of both Sport Education and TPSR [in which] the relative contribution of Sport Education and TPSR changed, depending on the stage of the season” (p. 34).

The preliminary indication is a TGA blended with SE and TPSR holds great promise when skillfully implemented in schools or universities. However, in reviewing the literature concerning approaches to teaching that have been inspired by a TGA, SE, or TPSR model, I found no significant initiatives in which the three instructional models were implemented in a unified format in PETE and/or the K–12 PE setting.

The Pillars of a Socratic Gymnasium

The main pillars of the Socratic gymnasium are the combined utilization of TGA, SE, and TPSR, all of which, as established earlier, are student-centered constructivist instructional and curriculum models. Figure 1 shows how the three models are connected with each other through their student-centered constructivist intentions. The main lines of connection highlight their interrelationship and the way in which each contributes to a student-centered PE program in the PETE and possibly K–12 teaching environment. Each model connects in certain aspects with the other, beginning with SE as the curriculum model based on which the teaching units are organized. Connected to SE is the dominant teaching method TGA for instructional delivery, and TPSR is connected to both as the social foundation to develop the proper socially responsible community. All three models connect to developing the Socratic gymnasium through the Socratic dialogue that is represented in each part or step of the teaching–learning process, which will be demonstrated later through examples from my classes. Next, I will describe each of the models briefly, as well as the Socratic gymnasium, the connecting link. Because of space limitations, only a brief introduction to the teaching models can be provided with an emphasis on their most important characteristics toward the purpose of this article.



Figure 1. The pillars and their relationship.

The Curriculum Design Pillar: Sport Education

SE is a curriculum model designed to provide students with enjoyable, authentic experiences that contribute to a students' desire to become and stay physically active later in life (Siedentop, Hastie, & Van Der Mars, 2011). This model is focused on students' development to achieve competence in an activity. Throughout the duration of the season they gain confidence and come to enjoy the activity. The premise is that through enjoyment and success students will be more motivated to continue to learn and improve (Siedentop et al., 2011). Key components of SE are seasons, team affiliations, formal competition, record keeping, and a culminating event. This system allows students to understand the history and the appropriate competitive spirit that is in accordance with each sport. With traditional pedagogy, in which skills are typically taught in isolation, SE loses a significant part of its constructivist nature. Thus, combining SE with TGA is a natural step toward improvement in student learning and empowerment. Through SE, students are empowered to take on a responsibility in the class. Students are carefully selected into teams and then volunteer, or are chosen, for jobs such as coach, trainer, referee, equipment manager, or statistician. Every team member is able

to contribute in various ways, not only on the field of play. Dividing students into roles makes them take ownership of their actions.

The Teaching Pillar: The Tactical Games Approach

TGA is a model that is focused on teaching the tactics and corresponding skills needed for particular sports during game situations. This enables students to become tactically aware during game play and provides them with an opportunity to understand the importance of skill execution (Mitchell, Oslin, & Griffin, 2013). Mitchell et al. (2013) suggested that the main rationales for using the TGA are interest and excitement, knowledge as empowerment, and transfer of understanding and performance. These results of TGA can form the building blocks for students' success. Students' success is also based on the four lesson components of TGA: Initial Game, Question and Answer segment, Practice, and Final Game. In the Initial and Final Game, teachers use "conditions" to emphasize the purpose of the game to correspond to the specific learning objectives of the lesson. Conditions are the rule changes to emphasize on a specific task, resulting in a modified game that represents the main objective of the day's lesson. For example, in the overhead serve lesson, during which the main focus is on teaching the importance of the serve, the condition is that if students are able to hit the ball over the net successfully, they will receive 3 points instead of 1 point.

Community Development Pillar: Teaching Personal and Social Responsibility

SE alone can be motivating for student participation, but when it is combined with TPSR (Hastie & Buchanan, 2000), it also creates a sense of duty among students while they are in class. As noted earlier, Hastie and Buchanan tested the combination of the SE and the TPSR models, which they called "Empowering Sport." The results of this new approach were that "lower skilled students became more competent and showed increase in self-efficacy" (p. 34). Making students responsible for their actions essentially means allowing them to understand that their actions influence the entire class environment (Hellison, 2011). The TPSR model was developed to give students more responsibility, carefully putting them in decision-making positions. This helped students become more aware of the influence they have on their own life as well as on their community. In TPSR, effort and self-direction are critical to achieving a sense of personal well-being. Respecting others' rights, considering others' feelings, and caring about others are essential to achieving a sense

of social well-being. Achieving these outcomes is organized into Levels of Responsibility. The levels represent a continuation from *irresponsibility to responsibility*, moving from respect for oneself to respect and concern for others. These behaviors are first developed within the PE class and then used outside of the gym, in the home, and in community settings. The TSRP levels that were used in the Socratic gymnasium are introduced in Table 1.

The Socratic Method: The Connecting Link

The Socratic method, as used here, is a process of inductive questioning that results in the incremental acquisition of knowledge. The fundamental goal of the Socratic method is to increase understanding through questioning and inquiry (Chesters, 2012). The method of questioning is not limited to any one discipline and can include anything from mathematical equations to questioning oneself regarding one's beliefs (e.g., one's beliefs regarding PE pedagogy). Simply asking an array of questions, however, does not mean a Socratic dialogue is being used. Boghossion (2006) explained,

The presupposition of the Socratic Method is that there is a truth of the matter and that truth can be known through discourse, or, more specifically, through the elenctic process. The elenchus is a systematised question and answer process that is directed by the teacher and depends upon student involvement. Its purpose is to help those engaged in a dialogue discover true propositions through a sustained inquiry. (p. 716)

As used within this context, Socratic dialogue relies on a pre-designed set of questions that are arranged to lead the respondent in a particular direction. Initial questions may be designed to deconstruct previously held beliefs, thereby opening the door for the acquisition of new knowledge concerning the topic at hand. When, because of inductive reasoning led by the constructivist teacher, the student or teacher acknowledges that previously held beliefs and thought are inadequate, the mind gradually opens to new understandings that may have been previously concealed or obscured by traditionally held ideas. To this extent then, Socratic dialogue and reasoning are considered dialectical in nature as each answer leading to a synthesis eventually becomes the new thesis. Each answer builds upon the previous answer until the student logically reaches the goal of the lesson. Obviously, this requires students to think critically as they

Table 1
TPSR Levels

Behavior	Description	All the time	Most of the time	Some-times	Rarely	Never
Self -Control	Student does no harm to others verbally or physically; works well with others; resolves conflicts peacefully if they emerge	4	3	2	1	0
Participation	Student will participate in activity and take on various roles if asked; shows respect; stays on task when teacher is watching	4	3	2	1	0
Effort	Student tries to master every task and focuses on improvement but participates at times with reservation; listens and follows direction	4	3	2	1	0
Self-Direction	Student will stay on task without direct instruction or supervision whether working alone or with others; does not seem to follow bad examples or peer pressure	4	3	2	1	0
Caring	Student will help, encourage others, and offer positive feedback; works with everyone in the class willingly; asks and provides assistance to teacher and other students	4	3	2	1	0

reach higher levels of understanding. Critical thinking skills, therefore, lie at the foundation of the Socratic dialogue in the Socratic gymnasium.

The applicability of this notion of Socratic dialogue to the previous discussion is clear. When students actively participate, the potential for them to remain active and engaged is much higher. Rather than being passive recipients and being fed endless servings of content, the students are engaged in their own learning. Curiosity is aroused, rather than being stifled, and thinking is not only provoked and encouraged, but also demanded. Students actively learn from their classmates as they feed off one another's ideas.

A note of caution should be mentioned before continuing. The goal of Socratic reasoning and questioning is to stimulate critical thought in certain areas, for example, in this context, the importance of teamwork rather than individual accomplishment. The teacher must be careful not to teach by imposing ideas on students. Students must be encouraged to think critically in a logical manner as they incrementally gain knowledge. Consequently, although Socratic questioning can be implemented in the gymnasium or on the field in a number of ways, it is best if the teacher "pre-thinks" the main question and constructs a list of questions that would need to be addressed for the main question to be effectively addressed. Questions should be logically related and flow from one to another. Although the ensuing dialogue may take a number of directions given the differences between students and classes, this list can serve as a general guide to the question–answer sequence. For example, the Question and Answer session in the TGA follows exactly such a "pre-thought" order of questions for the students to understand the technical elements and tactical underpinning of each situation the games present to them.

Not only does this method have a greater potential to excite and actively engage students, it makes teaching more interesting to teachers, providing them with the opportunity to learn from their students in a manner that is not traditionally available to the didactic teacher. Rather than receiving questions that indicate little critical thought from the student, the teacher is asked questions that are the product of critical reasoning and that give rise to answers that themselves raise questions not previously thought of, thus creating situations in which the teacher is the student and the student is the teacher. A genuine community of learning can result, with critical thinking at its foundation. What is key here is the students, and often the teacher, are required to examine their own assumptions critically

as they examine the question at hand, leading them to think about their own beliefs critically.

For example, throughout years of teaching, I have encountered several instances of how questioning has developed a community of learners and how each community represented that “Socrates” was “present” in the models discussed above. In the first phase of an activity unit in SE, captains worked together to “scout” and “build” their individual teams. During the development of the teams, the captains had to discuss and negotiate among each other the proper development of the teams. These negotiations were heated at times because, even though these were PE majors, therefore adults, they at times exhibited immature, overly competitive behavior. In such time, the teacher needed to step in and question the students’ negotiating behavior. However, true to the Socratic dialogue, these questions were not instructions as to “how they should conduct themselves,” but questions regarding their belief about the role and virtues of being a captain. The questions were directed toward their sense of leadership and proper use of knowledge in executing difficult decisions. Making important decisions that resulted in the development of equal and competitive teams gave each team in the classes a sense of community even before the season started.

In addition, although questioning and reasoning may take time away from the activity, its power lies in that the most relevant answer was discovered as a result of constructive dialogue, hopefully removing the need to revisit it. This means that once students understood the reasons behind a decision, the teacher did not need to keep repeating the same instruction. Any teacher who has taught for an extended period has faced the problem of constant repetition. However, through a Socratic dialogue, whether the issue was related to conflict resolution, technique, or tactics, once the students discovered the answer through this method, it seemed to stay with them throughout the season.

The second excellent example happened in relation to another net game, in a tennis class, during which the TGA was used as the teaching model. The students were involved in the “preseason” preparation of the SE tennis unit and were learning court positioning. The lesson was specifically focused on court positioning at the net in preparation for a volley. As it is a commonly accepted “truth,” players should position themselves somewhere halfway between the net and the deep end of the service line. Therefore, traditional lessons were taught to ingrain this positioning in the students’ minds through repeated practice. However, on several occasions students

approached the teachers with the following problem. During the initial game and the closing game, they tried to position themselves in the “right” place on the court, only to find that their opponents were able to lob over them regularly. One asked if he, being shorter and not having an excellent jumping ability, could move back a bit to be able to take some of those lobs out of the air and volley them back to the opponent. This led us to an additional Question and Answer session with the class in which the students and the teachers discussed how the “proper technique” at times must be altered based on body compositions, skills, and abilities. From this open dialogue, not only did the students learn that the “truth” can be varied, but the teachers also learned that same valuable lesson. I contend that if the community had not been completely student centered and constructivist in nature, such Socratic dialogue would not have occurred.

Finally, the third example demonstrates TPSR in action. In one of the tournaments, a team’s consistent level of positive behavior resulted in winning the tournament even though another team scored more points in the championship game. How? At the conclusion of each lesson, a brief dialogue occurred between members of the teams, as well as between the teacher and the teams, regarding their efforts to develop a responsible community. In this particular case, one of the teams had consistently violated the responsibility rules that the class had established. Their peers regularly warned them throughout the season regarding their lack of personal and social responsibility. During the championship game, the TPSR “judges,” their peers, had pointed out to the teachers that this team had been collecting so many negative points that they would lose the tournament even if they won the game. Thus, when the award ceremony arrived, the team in question was called to the podium as the second place finisher and was shocked and, of course, questioned the decision. Then, an extremely significant response occurred. Although the teacher offered to give the explanation, one of the students, the main TPSR student judge, offered to lead the Socratic dialogue with the team in question. This young man had prepared for several days for this moment and then led an extremely skilled Socratic question and answer session. He skillfully led this team to realize when and why their own behavior was not satisfactory. In addition, he also worked with them to rebuild and to form a personally and socially responsible community within their team. The result was one of the most defining moments in the Socratic gymnasium. During the next unit, the team asked to stay together, and they became one of the highest functioning and achieving teams for the year. In fact, some

of these students still get in touch with me from time to time to show how this one event had an extremely significant effect on their lives and their everyday decision making.

I believe the above examples demonstrate the power of dialogue in contrast to direct instruction, community in contrast to individuality, and responsibility in contrast to irresponsibility. Ultimately, every preservice teacher (PST) that I teach will have to learn to become responsible for his or her own actions and will have to learn to find the common denominator within the community. Providing the proper community for such development has to start, if not at home, then certainly in school.

The Implementation Steps

Understanding the challenges that arise with implementing new ideas in a field dominated by tradition may prove difficult to some, and thus, I include an example of a block plan and a sample lesson in an attempt to offer a brief introduction. The foundation for the lessons was the SE model with preseason, season, culminating event, traditions, and, of course, responsibilities. Each lesson had a TGA lesson format as the main basis for the Socratic dialogue, and TPSR was incorporated for all students. The volleyball game season was designed to correspond with the pedagogical recommendations of TGA (Mitchell et al., 2013), the curriculum framework used in SE (Siedentop et al., 2011), and the steps to develop a responsible community used in TPSR (Hellison, 2011). Specifically, students remained on one team throughout the entire season of 10 lessons. During these 10 lessons, students learned several basic skills and strategies of volleyball, in combination with preseason games and formal competition leading to the culminating event, the “NCAA” Championship. Besides being players, students also took on roles, including coach, trainer, statistician, publisher, referee, and equipment manager. The structure of the season is outlined in a block plan in Table 2.

Next, I will introduce one of the lessons from the block plan in detail. In addition, I will provide an example of each assessment rubric used for skill assessment and the assessment of students’ personal and social responsibility. The rubrics represent a variation of techniques to provide a selection for the reader. If teachers find they need skill or strategy evaluations more and TPSR assessments less, they can vary the tools they apply. One suggestion, however, is to include students in all levels in the discussion, design, implementation, and evaluation of tools that are used in the Socratic gymnasium.

Table 2
Volleyball Season Block Plan

Lesson 1: Intro to Volleyball	Lesson 2: Passing	Lesson 3: Setting	Lesson 4: Spiking	Lesson 5: Court Positioning
Assessment: Team contracts: Students will negotiate the varied roles among themselves and then will write up a contract by themselves with the leader-ship of the teacher.	Assessment: Peer and coach assessment: Students and the coach will use a rubric that will be designed by the teacher, but can and will be modified based on student input through discussions built into the unit. (See Table 3 for example)	Assessment: Learning TPSR: Each team has to come up with descriptors for their scale of social responsibility. These descriptors need to relate to their involvement as a member of a sports/group/team learning to develop skills and knowledge for competition.	Assessment: Peer-reporting TPSR sheets: peers within the team check for each other's representation of the five agreed behaviors to provide feedback. In addition, students will discuss with their peers if there is difficulty with exhibiting the behaviors and why. (Table 1 and Figure 1)	Assessment: Self-evaluation: Students will self-assess their performance based on agreed upon skill performance standards. (See Table 4 for similar example)
Lesson 6: Serving	Lesson 7: Blocking	Lesson 8: Communication	Lesson 9: NCAA Volleyball Playoffs	Lesson 10: NCAA Volleyball Championship
Assessment: Peer-assessment (See Table 4 for exact example) Peer assessment: TPSR (Table 1 and Figure 1)	Assessment: Self-assessment: TPSR (Figure 1 and Table 1)	Assessment: Self-assessment: TPSR (Figure 1 and Table 1) Communication assessment (Figure 2)	Assessment: Peer assessment: TPSR (Table 1 & Figure 1)	Assessment: Poster/binder presentation
		Team E: Caring Each team needs to present their ideas to the class. (Table 1)		
		Team A: Self Control Team B: Participation Team C: Effort Team D: Self-Direction Team E: Caring		

Net Games: Volleyball Lesson

Lesson 6

Serving

- Students will get into their teams.
- **Equipment Manager** will gather materials needed for the day.
- **Stretch/Warm-Up:** led by the **Trainers**, and then report to designated courts.

Lesson Breakdown

- **Initial Game:** 5 points for scoring off the serve (ace), in any way they can initiate a serve; 3 points for getting the ball over net in any way they can with their hands; and 1 point for all other scores.
 - Each player will have an observer on another team evaluating their TPSR levels based on a simple rubric (see Table 1 and Figure 2).
 - After the game, they will meet with the observer and discuss what they saw and why. Providing feedback to what they liked and could improve on.
- **Q&A:** What was the purpose of the initial game? (To get the ball over the net in any way they could as long as they used their hands.)
- **Why is the serve important?** (There could be a variety of answers, but mostly the students will say it starts the play or that it is the first line of attack.)
- **Can you tell me what ways you were able to get the ball over the net?** (Here the students will have the chance to explain every serve with which they may have experimented and found worked for them.)
- **How did you perform the serve and why did you serve that way?** (What the teacher is looking for here is a variety of answers, as some may have served overhand or underhand, some with spin, some flat, some facing the target, some sideways. In addition, some students may find that depending on the game situation such as a “must make” as the next point wins, they may be using a different serve than if they have the lead and can “experiment.” But the teacher is looking for similarities the students would agree to be the basics of all efficient serving skills. Example could be stag-

gered stance, nondominant hand holding the ball, dominant hand open, toss the ball high, bringing arm back and then forward, weight transitioning forward, and follow through.)

- **Demonstrate:** In the demonstration, the teacher asks each of the students with a different idea to demonstrate the serve with which they experimented and found success.

Name: _____

Date: _____

Self- and Peer Reporting TPSR: Volleyball

As you remember, we have discussed TPSR—Don Hellison’s model—and how we will be using it in our class. You will be responsible for assessing either your own behavior or a partner’s behavior. **After thinking about the different displays of behavior you have witnessed today, circle which level applies, and on the back state whom are you assessing (either yourself or a partner). Be sure to give examples!**

What is your level currently: 0 1 2 3 4

Why? _____

How did your responsibility level change, and why do you think it changed?

Figure 2: TPSR self- and peer assessment.

- **Practice:** *Trainer* and *Coach* will have a server on one side of the half court, three players ready to receive, continuing to work on the other hits to get it over to the server. Server will be asked to experiment with each of the serves discussed during the question and answer session and, at the end, choose their top serving forms and the reasons behind them. They will rotate after two tries.
- Final Game: 5 points for scoring off the serve (ace), 3 points for getting the ball over the net, and 1 point for all other scores.
 - Each player serves twice. They choose which serve they will use.
 - Each player will have to monitor their serving success for a self-evaluation to be conducted at the conclusion of the class (see Table 3).

Table 3
Self Skill Assessment Rubric

Name: _____

Self-Assessment: Serving

Answer the check sheet honestly. At the end, write what you are good at and what you need help with. If you have questions or see a need for improvement, write it in the Questions and Need for Improvement column.

Question	Always	Most times	Rarely	Questions and need for improvement
Are you in a staggered stance?				
Do you make good contact with the ball?				
Do you follow through?				
Does the ball go over the net?				
Can you place the ball?				

Closure Questions/Review

- *Statisticians* will report scores of the day to the teacher.
- *Referees* will have a meeting to discuss issues they saw.
- *Publisher* will collect the peer assessments and place in the binder.
- *Equipment Managers* will put the materials away.
- *Teams meet as a group* to discuss their TPSR levels and skills that were measured with the assessment throughout the class.

Conclusion

In conclusion, the proposed pillars of a Socratic gymnasium, the constructivist approaches identified herein, have several elements in common. Most obviously is they are student centered. All are used to engage the student in lessons and learning that could transcend the classroom and could serve as a foundation for everyday life. These lessons include not “simply” physical skills, but also lessons regarding conflict resolution, teamwork, ethical behavior, and the importance of rules and positive social interaction. All are used to engage students as active participants in the construction of their own life. All involve greater levels of student satisfaction with the content, and therefore, all make the discipline of PE, and the essential benefits offered by it, more meaningfully available to students of all ability levels. Also important, all have at their foundation the essential elements of critical thinking. These elements of the Socratic gymnasium in PETE are in congruence with Hastie and Curtner-Smith’s (2006) recommendation that teacher educators, when using a constructivist approach to teaching PE, organize learning environments in which

students must be active learners, in that they perform tasks which involve solving problems and making decisions; social learners, in that they formulate knowledge by interacting with their peers; and creative learners, in that they discover and understand knowledge by experimenting with the subject matter. (p. 22)

Consequently, I contend, when these methods are used within the context of the Socratic temperament and Socratic dialogue, physical educators in PETE and K–12 settings can become uniquely positioned to perform a critical role in transmitting knowledge about

physical activity that transcends the moment and that aids, informs, and prepares the students to deal with the vicissitudes of everyday life. The Socratic gymnasium is an approach in which the basic elements for teaching sport concepts and skills are ideally combined in a constructivist, student-centered manner. The ultimate decision of applying the tenets of a Socratic gymnasium, however, will be greatly dependent on a number of factors. Some of these are the future teachers' beliefs about their role as the transmitter of knowledge, the future teachers' level of comfort regarding their own teaching skills, and, of course, available space and equipment for activities. The above cannot be addressed in this article, but it would be interesting to study how teacher educators, practicing PE teachers, and future teachers with varying beliefs, abilities, and teaching contexts implement the Socratic gymnasium in PETE and K–12 settings.

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PEDAGOGY - DANCE

Task Design and Skill Level Perceptions of Middle School Students Toward Competition in Dance-Related Active Gaming

Eve Bernstein, Anne Gibbone, Paul Rukavina

Abstract

In this study, we drew upon McCaughtry, Tischler, and Flory's (2008) reconceptualized ecological framework to examine middle school students' perceptions (N = 391) of competition in physical education, specifically after participating in noncompetitive and competitive active gaming (AG) sessions. Chi-square tests of independence were computed on students' open-ended questionnaire responses. In terms of the AG sessions, students enjoyed AG and felt happy regardless of the task structure; however, what they liked and disliked about the AG tasks varied according to skill. Lower skilled students in the noncompetitive situation focused on success more frequently and in the competitive situations reported liking task elements and competition less frequently than did other skill groups. Discussion was focused on improvements in equipment features and task design to enhance students' experience.

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Note. This study is the second of two papers. The first published paper is different in an analysis of gender and grade-level differences for the same sample.

Physical education activities can help students acquire the skills, knowledge, and dispositions needed to live a healthy, active lifestyle (Centers for Disease Control and Prevention, 2012). Students report, however, that activities are often repetitive, boring, and irrelevant to their lives (Cothran & Ennis, 1999; Subramaniam & Silverman, 2002). As one way to foster student interest, physical educators have incorporated active gaming (AG) activities or units (Hansen & Sanders, 2010). AG involves video simulations that include movement, unlike traditional video game play during which players remain sedentary. Finding activities to which students can relate is important during middle school as physical activity declines (Chen & Hancock, 2006; Sallis, Prochaska, & Taylor, 2000). This is especially important as low skilled students might not have the skill to participate in some activities (Ennis, 2000). Energy expenditure has been investigated during the use of AG (Bailey & McInnis, 2011; Fawcner, Niven, Thin, MacDonald, & Oakes, 2010; Gao, Hannon, Newton, & Huang, 2011), but little is known about how students perceive AG in physical education and if students of different skill levels find it enjoyable.

How physical educators design the students' learning environment is an important component to creating student interest (Ennis, 2000; Ennis et al., 1997). Using ecological theory, McCaughtry, Tischler, and Flory (2008) conceptualized the ecology of the gym is created through negotiations between teachers and students. Teachers and students enter physical education with goals and objectives, and these negotiations influence how students engage in the task and how teachers respond to the behavior of the students. Teachers' and students' behaviors make up the "negotiated plan of action," or interaction of behavior through three task systems: instruction, social, and managerial. Teachers design tasks not only so students perceive their relevancy, but also with a careful consideration of the social system or the nature of how students relate and interact with their peers while they learn. Finally, the task is presented and managed in a way in which students have clear expectations of what and how they should complete the task (i.e., rules, routines, and accountability).

The introduction of competition in a physical education task system can change the negotiated plan of action (Rink, French, Werner, Lynn, & Mays, 1992). In most competitive situations, the task goal is to outperform or score more points than the other person or team. Often, the contest winner is designated by skill, whereby the higher

skilled students experience success and the lower skilled do not. If the teacher does not create a learning environment that “levels the playing field,” the lower skilled students could be spotlighted for poor performance and may not be able to participate in the task. This could lead to a negative spiral of feeling embarrassed, continued lack of success, and students not wanting to participate (Carlson, 1995; Ennis, 1996). Skill is important because it allows students to participate at a level comparable to their peers and achieve success in the task. Experiencing success promotes interest in physical education and continuation in tasks (Bernstein, Phillips, & Silverman, 2011; Rink, 1993; Portman, 1995; Silverman, 2005). Thus, it is important to create task structures in which students receive appropriate practice trials. Appropriate practice trials are related to an increase in skill and students’ enjoyment in the task (Silverman, 1990; Silverman, Dodds, Placek, Shute, & Rife, 1984).

Research indicates that if AG tasks are structured correctly, it positively affects students’ participation and enjoyment (Staiano, Abraham, & Calvert, 2012; Staiano & Calvert, 2011). However, no researchers to our knowledge have investigated students’ perceptions of the negotiated plan of action in competitive and noncompetitive AG tasks in physical education and if students of different skill levels have similar or different perceptions of the task. The purpose of this study was to examine middle school students’ perceptions of AG during two task systems by students’ skill level. Gaining insight from the students’ perspective can help educators understand students’ motivational attributes or how they attribute success or failure in AG task systems (Ferrer-Caja & Weiss, 2000).

Method

Participants and Setting

Middle school students ($N = 391$) between the ages of 10 and 14, from an eastern United States public school were involved in this study (188 females, 203 males). The middle school population was 627 students of which 80 sixth graders, 185 seventh graders, and 125 eighth graders participated. Parental opt-out forms and child assent was conducted in agreement with IRB approval and the school district. Sixteen physical education classes participated in the study and one male and one female physical educator. This paper is a second paper on AG in which gender and grade level differences of

these participants were analyzed (Gibbone, Bernstein, & Rukavina, 2013).

Team teaching was a typical format for these teachers, so approximately 50 students were partaking in a class session. The full gymnasium was used, and televisions were placed in stations across the length of both sides of the room and a large projector screen was set up on one end. The screen accommodated larger groups of students, and the 10 television stations comprised six with dance pads for *Dance Dance Revolution* and four with remotes for *Just Dance* or *Dance Central* games.

Instrumentation

Two questionnaires were used to collect data. The first questionnaire was a preassessment administered before students engaged in AG in which students were asked to write a response to the statements “I like competitive sports or activities because” and “I do not like competitive sports or activities because.” The second questionnaire was completed after the first round of AG during the non-competitive focused session, and this Active Gaming Questionnaire contained three open-ended questions: “What did you like about this session?”, “What don’t you like about this session?”, and “How did you feel when you were playing today?” The Active Gaming Questionnaire was also used after the second round of AG, which was 2 days later, during the competitive focused session. These open-ended questions were selected because of the exploratory nature of this study. An instrument needed to be created because of the lack of literature regarding this particular topic.

An additional instrument was used to assess students’ skill level. Both teachers were familiar with using rubrics to assess student skill performance and learning outcomes. We asked the teachers to rate their students’ skill level using a rubric we designed. We adapted this rubric from the 2007 New York State Education Physical Education Profile (refer to Table 1). Both teachers were asked to observe all of the students who participated in the study and together assign them a score.

Table 1

Categories for Determining Students' Dance-Related AG Skills and Sample Percentages

Low skilled	Medium skilled	High skilled
29%	50%	21%
Student effectively and consistently demonstrates the intended dance techniques; proper posture and positioning; and spatial patterns with few, if any observable errors in technique	Student effectively demonstrates the intended techniques with minor errors	Student demonstrates some of the intended techniques, but performance is ineffective and inconsistent

Note. Categories adapted from the NYS PE Profile rubric for Dance & Aesthetic activities.

Procedure

For the first AG session, students were instructed to participate by “just having fun.” The teacher asked students to be active for the entire class, practice dance moves, and be considerate to their classmates. Students were told not to be concerned with who wins or who is using the remote as the idea was to set up a recreational climate without scoring and competition. The teachers’ objective for the lesson was threefold: psychomotor (to participate in moderate physical activity for the class period), affective (to learn group processes through positive social interaction), and cognitive (to interpret rhythm and dance patterns).

Students completed the preassessment prior to any AG activity. At the next class meeting, students were introduced to the lesson with instructions to participate by “just having fun” to set the stage for recreational play void of scoring and imposed competition. Students at the *Dance Dance Revolution* stations were to share the dance mats and engage in shadow play while not on the mats to enjoy the activity with their classmates. The technique of shadowing involves mimicking the moves without having the motions transmit to the game. Those playing games that do not require a mat were not concerned with shadowing as all users simply followed the motions together as a group. Visiting different stations was allowed; however, students were told that wasting time by wandering was

not acceptable. Once the class period was almost at its end, students stopped play and completed the Active Gaming Questionnaire based on the establishment of a noncompetitive focused climate.

At the following meeting, the same students participated in AG; however, the conditions of the task were changed. The teachers' objective for the lesson was the same as the first session; however, the expectations and climate were changed based on the instruction and management of the task. All stations were to be used so a competitive game was always the focus. They were to select a battle mode and their own challenge level. The goal was to earn the most points possible during the class period. Since these students typically had prior experience playing the games, either at home or in physical education during other times of the year, they were able to maneuver through the game setting and had knowledge of how to gain points. After each round, the students added up their score to see how many wins they achieved. The students still rotated turns, so shadowing allowed for practice time between bouts. Again, at the end of the class period, students were asked to voluntarily complete the postactivity questionnaire related to their likes, dislikes, and feelings, now focused only on competitive AG. In this situation, students challenged other students during the class time and were to keep score by selecting a battle mode at their own difficulty level. The goal for the class period was to earn as many points as possible by scoring higher than their opponents. Students were told that those with the top scores would receive lollipops. Shadowing in this case was emphasized as "good practice time" between bouts. Once the session was near its conclusion, students again completed the Active Gaming Questionnaire based on the goal of the competitive focused session.

Results

Preassessment

The open-ended questions "I like competitive sports or activities because" and "I do not like competitive sports or activities because" were not significant for skill level, $\chi^2(12) = 14.001, p < .301$; $\chi^2(8) = 7.408, p < .493$. For the entire sample, however, students indicated fun (33.2%) most frequently, $\chi^2(6) = 151.548, p < .001$ (see Table 2 for definitions, Table 3 for frequencies). For dislikes, offensive behaviors by other students was the most frequent student response (46.7%), $\chi^2(4) = 104.571, p < .001$ (see Table 3 for frequencies, Table 4 for definitions).

Table 2

Categories and Sample Responses for the Question, "I like competitive sports or activities because"

Code	Definition	Samples
Activity	It is associated with wellness	"I get in better shape. It keeps me healthy. They make me more active. They can release stress. It gives you good exercise."
Character	Individuals are competitive by nature	"I am athletic. I am a competitive person. It's what athletes do."
Fun	Tasks are fun and exciting	"They are fun. It is exciting. It is a rush of energy."
Gratified	Tasks affect satisfaction and self-accomplishment	"I feel proud. I try my best. It is good for self-esteem. I like to show what I can do. I feel accomplished. They help me focus."
Improvement	Tasks are challenging and help skill development	"I like the challenge. I test myself. They push me. It helps me get better. It is good practice."
Social	Promotes socializing and engagement with others	"I can work with others. I can play with my friends & other teams. I meet new people. It teaches you teamwork."
Win	Enjoyment of winning and comparing scores	"I like to win. I get to play against others. You know who won and lost."

Table 3

Preassessment Frequencies and Percentages for the Sample in Response to Open-Ended Questions

Variable	I like competitive sports or activities because		Variable	I don't like competitive sports or activities because	
	Frequency	%		Frequency	%
Active	67 (62)	15.4	Hurt	12 (42)	5.7
Character	22 (62)	5.1	Offensive	98 (42)	46.7
Fun	144 (62)	33.2	Skill	26 (42)	12.4
Gratified	36 (62)	8.3	Losing	32 (42)	15.2
Improvement	67 (62)	15.4	Task	42 (42)	20.0
Social	47 (62)	10.8			
Win	51 (62)	11.8			
Total	434	100	Total	210	100

Note. Expected frequencies in parentheses. The total number of responses exceeds the sample size because of double coding of participants' responses.

Table 4

Categories and Sample Responses for the Question, "I don't like competitive sports or activities because"

Code	Definition	Samples
Hurt	Getting hurt through roughness or physical contact	"I get hurt. People can get hurt. People get too rough."
Offensive	Playing with others who are overly competitive and/or exhibit poor sportsmanship	"People cheat. People fight. Others are unsportsmanlike. They break rules. People brag. Others are mean. It gets way too competitive. People take it too far. People get too into the game. People lose their temper. People get too violent."

Table 4 (cont.)

Code	Definition	Samples
Skill	Having a perception of low skill level or low self-efficacy	“I am not good at it. It is too hard. I mess up.”
Losing	Feeling of being defeated	“I don’t like losing. I feel bad when I lose. I am upset when I lose.”
Task	Purpose of competition and how activities are structured	“They are boring. They are not fun. I just don’t like them. I am not a competitive person. They take a lot of time. I like to play for fun. The people I play against are too good or not good. I don’t like the activity. People don’t cooperate with each other. They make me tired. Not enough playing time.”

Noncompetitive AG Assessment

Lower skilled students reported enjoyment (17.2%) less frequently than did medium skilled (24.6%) and higher skilled (23.1%) students when asked about what they liked after participating in the noncompetitive AG session, $\chi^2(12) = 41.828, p < .001$ (refer to Table 5 for definitions, Table 6 for frequencies). Lower skilled students indicated liking success (8.6%) more frequently than did medium skilled (2.4%) and higher skilled (3.4%) students; however, lower skilled students expressed liking nothing more frequently (7.8%) than did medium skilled (.5%) and higher skilled (2.6%) students. Overall, the task (32.5%), followed by exercise (23%) and enjoyment (22.2%), was most frequently reported for this sample, $\chi^2(6) = 274.794, p < .001$ (refer to Table 7).

Table 5

Categories and Sample Responses for the Question, “What do you like about this session?” for the Noncompetitive and Competitive Active Gaming Sessions

Code	Definition	Noncompetitive session	Competitive session
		Samples	Samples
Competition	Comparing scores and having a winner determined	“I like trying to beat other players. It got competitive.”	“That it was competitive. It was more interesting. Competing. We got to compete. You get a score. I like playing tournaments.”
Enjoyment	Pure interest and fun	“I think it is awesome. It is cool. It was fun. It is exciting. You get to have a lot of fun.”	“It is more fun. It is fun. It was exciting. It gets me pumped.”
Exercise	Moving and being physically active	“I like moving my body. It is active. Very intense. It is a major workout.”	“It is a good workout. That you get exercise. To be active. It burns calories.”
Nothing	No likes	“Nothing.”	“Nothing.”
Social	Promotes socializing and engagement with others	“I like playing with my friends. Choosing who I am playing against. Multiple people can play. I can be silly with others.”	“I got to play against my friends. You can play with who you want. I was with friends.”
Success	Personal achievement and improvement	“I did better. I advanced a level. I can practice. I can learn new moves.”	“I advanced in the game. I did better. I got better. I got a lot of points. I tried harder levels.”
Task	Skill application and game features	“It was a different kind of game. You got to pick any station. I like dancing. Dancing. We choose the songs. It is fast paced.”	“You get to dance. The dancing. The dance moves. The moves were fun and difficult. I got to pick my song.”
Everything	No dislikes	N/A	“Everything.”

Table 6

Frequencies and Percentages for the Question, “What did you like about this session?” in the Noncompetitive and Competitive Active Gaming Session

	Lower skilled		Medium skilled		Higher skilled		Total
	Frequency	%	Frequency	%	Frequency	%	
Noncompetitive							
Competition	0 (1.7)	0	0 (2.8)	0	6 (1.5)	5.1	6
Enjoyment	22 (28.4)	17.2	52 (46.7)	24.6	27 (25.9)	23.1	101
Exercise	30 (29.5)	23.4	50 (48.6)	23.7	25 (26.9)	21.4	105
Nothing	10 (3.9)	7.8	1 (6.5)	0.5	3 (3.6)	2.6	14
Social	16 (17.4)	12.5	31 (28.7)	14.7	15 (15.9)	12.8	62
Success	11 (5.6)	8.6	5 (9.3)	2.4	4 (5.1)	3.4	20
Task	39 (41.5)	30.5	72 (68.5)	34.1	37 (38)	31.6	148
Total	128	100	211	100	117	100	456
Competitive							
Competition	19 (26.8)	15.1	48 (44.2)	23.1	22 (18.1)	25.9	89
Enjoyment	30 (31.3)	23.8	53 (51.6)	25.5	21 (21.1)	24.7	104
Everything	3 (3.6)	2.4	5 (6)	2.4	4 (2.4)	4.7	12
Exercise	19 (11.7)	15.1	18 (19.4)	8.7	2 (7.9)	2.4	39
Nothing	11 (3.9)	8.7	1 (6.5)	0.5	1 (2.6)	1.2	13
Social	7 (16.2)	5.6	36 (26.8)	17.3	11 (11)	12.9	54
Success	10 (6.9)	7.9	13 (11.4)	6.3	0 (4.7)	0	23
Task	27 (25.6)	21.4	34 (42.2)	16.3	24 (17.2)	28.2	85
Total	126	100	208	100	85	100	419

Note. Expected frequencies in parentheses. The total number of responses exceeds the sample size because of double coding of participants' responses.

Table 7

Questionnaire 2 Frequencies and Percentages for the Sample in Response to Open-Ended Questions

Variable	Likes for the noncompetitive AG session		Likes for the competitive AG session	
	Frequency	%	Frequency	%
Competition	6 (65)	1.3	89 (52)	21.2
Enjoyment	101 (65)	22.2	104 (52)	24.8
Exercise	105 (65)	23.0	39 (52)	9.3
Nothing	14 (65)	3.0	13 (52)	3.1
Social	62 (65)	13.6	54 (52)	12.9
Success	20 (65)	4.4	23 (52)	5.5
Task	148 (65)	32.5	85 (52)	20.3
Everything	N/A	N/A	12 (52)	2.9
Total	456	100	419	100

Note. Expected frequencies in parentheses. The total number of responses exceeds the sample size because of double coding of participants' responses.

When asked about dislikes (refer to Table 8 for definitions, Table 9 for frequencies) following the noncompetitive AG session, $\chi^2(10) = 23.908, p < .008$, lower skilled students indicated the task (26.9%), or how competition was structured in the activity, more frequently than did medium skilled (10.6%) and higher skilled (17.9%) students. Constraints (40%) were most reported for all skills levels in this sample, followed by having no dislikes (23.2%), $\chi^2(5) = 166.874, p < .001$ (refer to Table 10).

Table 8

Categories and Sample Responses for the Question, “What don’t you like about this session?”

Code	Definition	Noncompetitive session	Competitive session
		Samples	Samples
Constraints	Attributes of the task structure	“I only got a few songs in. You have to wait a while to go. There are not enough remotes. Some groups were too big.”	“It gets too competitive. I don’t like to shadow. I don’t like waiting to use the remote. I don’t like that too much time is in between songs. I don’t like waiting for a turn.”
Everything	No likes	“I do not like anything.”	“Everything. I don’t like it.”
Interactions	Unfavorable feelings related to others	“People were bothering me. Others kept jumping in and messing me up. People were hogs.”	N/A
Nothing	No dislikes	Nothing	“I liked everything. Nothing.”
Performance	Personal outcomes	“Tired. I can’t keep up with the beat. Dancing is tiring. People watch you. I don’t like dancing in front of people.”	“It is embarrassing. I don’t like dancing in front of people. I don’t like getting tired. It’s tiring.”
Task	Skill application and game features	“The mat messes me up. You have to get it on the line or it does not count. It is boring. Some songs are bad.”	Disliking the task “It is boring, I don’t like dancing. I don’t like jumping. Some of the songs.”
Losing	Being defeated	N/A	“When I lose. I lost. Losing. People beat me.”
Difficulty		N/A	“It was too fast. It was hard.”

Table 9

Frequencies and Percentages for the Question, “What don’t you like about this session?” for the Noncompetitive and Competitive Active Gaming Session

	<u>Lower skilled</u>		<u>Medium skilled</u>		<u>Higher skilled</u>		Total
	Frequency	%	Frequency	%	Frequency	%	
Noncompetitive							
Constraints	29 (37.3)	31.2	70 (56.9)	49.3	22 (26.8)	32.8	121
Everything	8 (4.6)	8.6	4 (7.1)	2.8	3 (3.3)	4.5	15
Interactions	2 (4)	2.2	6 (6.1)	4.2	5 (2.9)	7.5	13
Nothing	17 (21.6)	18.3	36 (32.9)	25.4	17 (15.5)	25.4	70
Performance	12 (9.5)	12.9	11 (14.6)	7.7	8 (6.9)	11.9	31
Task	25 (16)	26.9	15 (24.5)	10.6	12 (11.5)	17.9	52
Total	93	100	142	100	67	100	302
Competitive							
Constraints	27 (38.6)	26.5	65 (47.6)	51.6	18 (23.8)	28.6	110
Difficulty	16 (11.9)	15.7	10 (14.7)	7.9	8 (7.4)	12.7	34
Everything	6 (3.9)	5.9	5 (4.8)	4.0	0 (2.4)	0	11
Losing	4 (4.9)	3.9	7 (6.1)	5.6	3 (3)	4.8	14
Nothing	32 (28.7)	31.4	29 (35.5)	23	21 (17.8)	33.3	82
Performance	3 (6.7)	2.9	6 (8.2)	4.8	10 (4.1)	15.9	19
Task	14 (7.4)	13.7	4 (9.1)	3.2	3 (4.5)	4.8	21
Total	102	100	126	100	63	100	291

Note. Expected frequencies in parentheses. The total number of responses exceeds the sample size because of double coding of participants’ responses.

Table 10

Questionnaire 2 Frequencies and Percentages for the Sample in Response to Open-Ended Questions

Variable	Dislikes for the noncompetitive AG session		Dislikes for the competitive AG session	
	Frequency	%	Frequency	%
Constraints	121 (50)	40.0	110 (50)	37.8
Everything	15 (50)	5.0	11 (50)	3.8
Interactions	13 (50)	4.3	N/A	N/A
Nothing	70 (50)	23.2	82 (42)	28.2
Performance	31 (50)	10.3	19 (42)	6.5
Task	52 (50)	17.2	21 (42)	7.2
Difficulty	N/A	N/A	34 (42)	11.7
Losing	N/A	N/A	14 (42)	4.8
Total	302	100	291	100

Note. Expected frequencies in parentheses. The total number of responses exceeds the sample size because of double coding of participants' responses.

Results regarding the question about feelings during participation were not significant for skill level, $\chi^2(8) = 11.891$, $p < .156$; however, for the entire sample, happy was by far the most frequent response (48.6%), followed by active (18.3%), $\chi^2(4) = 211.256$, $p < .001$ (refer to Table 11 for definitions, Table 12 for frequencies).

Table 11

Categories and Sample Responses for the Question, "How did you feel when you were playing?"

Code	Definition	Noncompetitive session	Competitive session
		Samples	Samples
Active	Physically active and exercising	"My heart was beating faster. I was exercising. Good workout. Getting my pulse up. Active."	"Heart pumping. Fit. Active. Working my feet. My heart was racing. My heart was working."

Table 11 (cont.)

Code	Definition	Noncompetitive session	Competitive session
		Samples	Samples
Excited	Roused	“Excited. Alive. Hyper. Energized.”	“Very excited. Energetic. Pumped. It is a rush.”
Gratified	Satisfied and accomplished	“I can actually do something. I did good. I feel good about myself. I can do it well.”	“I am good. I can beat someone. Proud of my scores. I got to play a lot. I got much better.”
Happy	Pure enjoyment and fun	“Happy. It is fun. Really happy.”	“Like I was having fun. It is a good time. Happy.”
Neutral	Indifference	“Okay. Fine.”	“I felt okay. Normal. It was fine.”
Unpleasant	Unfavorable thoughts	“Embarrassed. I felt awkward. Bored.”	“It is boring. I am embarrassed. I feel nervous. People kept annoying us. Awkward. Annoyed.”

Table 12

Questionnaire 2 Frequencies and Percentages for the Sample in Response to Feelings During Participation

Variable	Feelings for the noncompetitive AG session		Feelings for the competitive AG session	
	Frequency	%	Frequency	%
Active	71 (77)	18.3	86 (67)	21.4
Excited	60 (77)	15.5	63 (67)	15.6
Gratified	32 (77)	8.3	23 (67)	5.7
Happy	188 (77)	48.6	199 (67)	49.4
Neutral	N/A	N/A	7 (67)	1.7
Unpleasant	36 (77)	9.3	25 (67)	6.2
Total	387	100	403	100

Note. Expected frequencies in parentheses. The total number of responses exceeds the sample size because of double coding of participants' responses.

Competitive AG Assessment

When students were asked about what they liked after the competitive AG session, $\chi^2(14) = 51.294$, $p < .001$, lower skilled students reported competition less frequently (15.1%) than did medium skilled (23.1%) and higher skilled (25.9%) students (Table 6). Similar results were found in the social interaction category for lower skilled students (5.6%), different than medium skilled (17.3%) and higher skilled (12.9%) students. Conversely, lower skilled students had higher than expected results for liking exercise (15.1%), which was different than medium skilled (8.7%) and higher skilled (2.4%) students. Overall, the group as a whole liked the enjoyment (24.8%), competition (21.2%), and the task (20.3%), $\chi^2(7) = 177.487$, $p < .001$ (Table 7).

As for what students disliked about the competitive AG, constraints (37.8%) and no dislikes (28.2%) were the most frequent responses, $\chi^2(6) = 216.536$, $p < .001$ (Table 10); however, lower skilled (26.5%) and higher skilled (28.6%) students did not report constraints as frequently as medium skilled students (51.6%) did. Lower skilled students (13.7%) indicated the task somewhat more than did medium skilled (3.2%) and higher skilled (4.8%) students. Lower skilled students (15.7%) also conveyed difficulty more than medium skilled (7.9%) and higher skilled (12.7%) students did, $\chi^2(12) = 40.646$, $p < .001$ (Table 9).

Results regarding the question about feelings after participation were not significant for skill level, $\chi^2(10) = 16.026$, $p < .099$; however, similar to the noncompetitive for the entire sample, happy was by far the most frequent response (49.4%), followed by active (21.4%), $\chi^2(5) = 373.710$, $p < .001$ (Table 12).

Discussion

According to McCaughtry et al. (2008), teachers and students negotiate the plan of action, which results in how interested and engaged students are in the task. We investigated middle school students' perceptions of competition in competitive sports and activities and their perceptions of competition after they participated in two dance-related AG task structures as a function of skill level. On the preassessment prior to students engaging in AG, students reported they liked competitive sports and activities for a variety of reasons, such as "having fun," being "active," feeling "gratified," being "challenged," and having the chance to "play against and work with others." There were no skill level differences within the

responses, which suggests that all students at different levels of skill enjoyed competitive activities and sports. Students in middle school can enjoy competitive sports for a variety of reasons (Bernstein et al., 2011).

Lower skilled students, however, reported they do not like competitive tasks in physical education when competition is heightened and they are unable to participate (Carlson, 1995; Ennis, 1996; Portman, 1995). In this study, students also reported they did not enjoy sport when peers became overly competitive, getting injured, and playing against others that were not of the same ability. Bernstein et al. (2011) found that students complained that they did not like it when some students displayed poor sportsmanship (i.e., mocked others when they won or took losing too seriously). These behaviors are typical when too much emphasis is placed on winning and social comparison is heightened because of that overcompetitiveness of the task (Hager, 1995).

In this study, the teachers' task goal was varied (competitive or noncompetitive) to see how students perceived those AG task systems. The way a task is designed and presented can increase students' enjoyment (Ferrer-Caja & Weiss, 2000). Regardless of the situation, the AG task systems created a positive experience. The students frequently reported they felt happy and active, which is consistent with other literature involving AG and youth's perceptions (Baranowski, Buday, Thompson, & Baranowski, 2008; Graves, Ridgers, Williams, Stratton, Atkinson, & Cable, 2010; Trout & Zamora, 2005).

Although students in all skill groups liked the AG tasks, the type of task goal (competitive or noncompetitive) was associated with different student perceptions. When competition was not requested in the task, lower skilled students reported they liked the success that they achieved. If students experience success while participating in a task, they are likely to continue their participation (Subramaniam & Silverman, 2002). This is especially important for lower skilled students, who are generally more prone to losing and feeling embarrassed if they are unsuccessful. If they consistently lose, they could start blaming themselves for their lack of success, which can contribute to withdrawing from participation (Carlson, 1995; Ennis, 1996).

When competition was added to the task design, higher skilled students focused on the competitive element of the task and the interaction that the competition brought more frequently than did the lower skilled students. Skill is an important factor in authentic game

play, and having the skill to be successful at an activity may increase students' enjoyment of that activity (Soberlak & Cote, 2003; Subramaniam & Silverman, 2002). Instead of focusing on competition, the lower skilled students more frequently focused on their enjoyment and being active in the task. AG can have relevance for students, and playing these games can create excitement (Gao, Hannon, Newton, & Huang, 2011; Sun, 2012). As physical activity can decline after middle school (Centers for Disease Control and Prevention, 2012), adding activities that students find interesting can be incorporated in future activity pursuits in adolescence and even adulthood (Haywood, 1991; Thin, Hansen, & McEachen, 2011). Unclear or improper task design can cause students to go off task or deviate from the task (Zmudy, Curtner-Smith, & Steffen, 2009). Although students overwhelmingly liked the AG tasks, in both task system situations, students frequently reported they disliked particular aspects of task, including specific game features and waiting for their turn to be in control of the equipment. Additional complaints included waiting too long for a turn, groups were too large, or not getting adequate feedback from the equipment, of which all can dissuade movement and inhibit enjoyment in physical education. Task design is an important part of enjoyment during gaming (Sweetser & Wyeth, 2005). The way the task is designed can increase or decrease students' enjoyment (Jegers, 2007)

However, students reported different dislikes as a function of participating in competitive and noncompetitive task situations. In the noncompetitive focused AG, students mentioned that unfavorable interactions appeared, such as some students were distracting others and monopolizing equipment. These dislikes could have been associated with the nature of the managerial task system because of the deficiencies and limitations in the AG equipment, such as sliding or unresponsive mats, limited song choices, or necessity to have a larger television screen for easier viewing. On the other hand, in the competitive focused session, students disliked "losing" and "difficulty." Introducing competition to an activity can invite inappropriate behaviors and motor performance when skill level demands do not match the participant (Silverman, 2005). Similarly, McCaughy et al. (2008) suggested students who do not perceive the task to meet their needs can become disengaged.

Other aspects of the AG situation influenced students' perceptions. In this study, as well as previously indicated (Gibbone et al., 2013), shadowing or mimicking the movements of the game through

observation limited a direct connection to the game for feedback. This was considered a task constraint. Shadowing has been suggested as a potential cause for lower levels of physical activity output because of the lack of feedback, and therefore, students were less motivated (Gao et al., 2011). Shadowing may not be the preferred technique for all as it may be better to have fewer students at a station instead of including shadowing because of limited equipment. Refining the tasks according to student's input helps in negotiating an ideal environment (McCaughtry et al., 2008). Only when students' perceptions and their experiences in an activity are incorporated in the process can teachers best evaluate and modify their lessons to enhance effectiveness.

To engage students fully, physical educators strive to appropriately match the challenge level of a task to the participants' level of ability (McCaughtry et al., 2008). Active video games can offer such components to players in that they are designed for recreation, provide options, contain a variety of levels to match those with different abilities, and provide informative feedback about personal performance (Hansen & Sanders, 2010). In this study, AG provided a natural way to differentiate instruction; students were allowed to select the difficulty level. It is unknown, however, if students did indeed select the most appropriate level or a level that was similar to the person against whom they were competing.

Also, students were allowed to play with whomever they chose and therefore were likely inclined to play with friends. Socializing is important to students, and effective teachers find a balance between instructional tasks and students' social systems (McCaughtry et al., 2008). When a social atmosphere provides opportunities for task mastery, perceived competence can be enhanced. Perceptions of the learning environment and perceived competence can influence task motivation (Ferrer-Caja & Weiss, 2000). Motivation can stem from the task itself, but also how the task is presented and how well students can competently complete the task (Deci & Ryan, 2002).

Students' perceptions can provide valuable information (Schmalz & Kerstetter, 2006) regarding AG lesson design for teachers and administrators. Despite the valuable information gained from students' perceptions, further research is necessary with a larger and more ethnically diverse sample as this study involved a convenience sample largely composed of Caucasian American students from one suburban middle school. Another limitation was not randomizing the order of activities during the classes. We assessed students' per-

ceptions in a real-life situation that was highly representative of the typical lesson design and availability of students at that school.

In conclusion, students' perceptions can give insight into the negotiated plan of action among tasks, class management, and peer socialization for lesson design and preparation (McCaughy et al., 2008). In this study, students enjoyed the friendly, competitive AG dance session because they liked the task and felt happy while playing. However, it was apparent students would have enjoyed the task further if improvements in equipment features and an increase in playing time were handled. Discovering issues that pertain to constraints helps educators provide a more productive and enjoyable experience for students. There is novelty regarding AG for now, but new technologies will continue to be developed and become the next motivational tools. By using students' input when planning task structures, teachers can account for a more effective learning experience for all students.

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PEDAGOGY - ELEMENTARY
PHYSICAL EDUCATION

**An Application of the
Trans-Contextual Model of
Motivation in Elementary School
Physical Education**

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Abstract

Elementary school physical education can play a prominent role in promoting children's leisure-time physical activity. The trans-contextual model of motivation has been proven effective in describing the process through which school physical education can affect students' leisure-time physical activity. This model has been tested in secondary education, but there is no evidence on the applicability of the model in elementary education. In the present study, we assessed the effect of motivation in elementary school physical education on leisure-time physical activity motivation and the related decision-making process. The sample consisted of 241 pupils ($M_{age} = 11.52$, $SD = .51$) recruited from elementary schools in Northern Greece. Participants completed a questionnaire including measures of physical education and leisure-time physical activity motivational regulations, attitudes, subjective norms, perceived behavioral con-

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trol, and intentions toward leisure-time physical activity. The results of hierarchical regression analyses indicated that motivational regulations in physical education best predicted the respective leisure-time physical activity regulations. In addition, leisure-time physical activity motivational regulations predicted intentions toward physical activity. Multiple mediation analyses indicated that the effect of leisure-time physical activity motivational regulations on intentions was partially mediated by perceived behavioral control. The findings support prior research and demonstrate an important mechanism of how motivation in elementary school physical education can influence leisure-time physical activity. Autonomous motivation in elementary school physical education led to higher students' intentions toward physical activity outside the school.

Physical activity participation plays an important role in preventing chronic noncommunicable diseases. According to the World Health Organization (2013), physical inactivity is the fourth leading factor for preventable diseases and premature death in developing and developed countries, accounting for more than 3 million deaths annually. Physical activity participation follows a developmental trend, in a way that physically active children and adolescents have significantly higher chances to be physically active adults (Ferreira, Twisk, van Mechelen, Kemper, & Stehouwer, 2005; Hallal, Victora, Azevedo, & Wells, 2006; Telama et al., 2005). Hence, it is important to promote physical activity participation in this age group. School physical education (PE) is a prominent method to promote physical activity participation in children and adolescents and accordingly build healthy lifestyle habits. In fact, participation in school PE should produce cognitive, affective, and behavioral outcomes that promote leisure-time physical activity (LTPA) participation (Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003). LTPA participation contributes largely toward maintaining a healthy lifestyle and abstaining from unhealthy behaviors in adolescence and in adulthood (Hallal et al., 2006; Telama et al., 2005). However, it remains a question if school PE promotes engagement in physical activity outside school. In the present study, we set out to assess if elementary school PE is associated with engagement in LTPA in school pupils. The theoretical backgrounds of the study are derived from the trans-contextual model (TCM) of motivation (Hagger et al., 2003), a model that explains the ways through which PE at a school level is linked to LTPA in children and adolescents.

Component Theories of the Trans-Contextual Model

The TCM includes components of self-determination theory (Deci & Ryan, 1985, 2002, 2012), the hierarchical model of intrinsic and extrinsic motivation (Vallerand, 2007), and the theory of planned behavior (Ajzen, 1985). Core elements of each approach are incorporated into the TCM and contribute to the development of a mechanism through which motivation in school PE can be transferred to LTPA (Hagger, 2009; Hagger & Chatzisarantis, 2012; Hagger et al., 2003).

More specifically, a core element of self-determination theory involves the distinction between intrinsic and extrinsic motivation. The former reflects engagement in an activity for the inherent pleasure and fun derived from involvement. Participation due to intrinsic motivation indicates high levels of self-determination. Extrinsic motivation, on the other hand, corresponds to engaging in an activity to obtain rewards or avoid punishment (Deci & Ryan, 2008). Four dimensions of extrinsic motivation have been identified, with varying levels of self-determination (Ryan & Connell, 1989).

First, integrated regulation is the most self-determined dimension of extrinsic motivation. In this dimension, participation in an activity is facilitated by the assimilation or matching of the activity at hand with other traits and attributes of the person. Second, integrated regulation, although with different characteristics, is also presented as a dimension of intrinsic motivation. In identified regulation, activity involvement is a result of the importance posed by the individual on the behavior for the self. Third, introjected regulation reflects engagement in an activity for external reasons, creating feelings of guilt or shame and self-derogation after failure. Finally, the least self-determined dimension of extrinsic motivation is external regulation. Externally regulated students participate in activities to obtain rewards or avoid punishment (Deci & Ryan, 2008). Intrinsic motivation and identified regulation create autonomous motivation, whereas introjected and external regulations control motivation (Ratelle, Guay, Vallerand, Larose, & Sénécal, 2007).

Motivational regulations are influenced by the perceived climate created by social agents such as teachers, parents, and coaches. According to the theory, the social agents' initiated climate can be either autonomy supportive or controlling. An autonomy-supportive climate reflects teachers' interpersonal behaviors aiming to develop students' internal locus of causality and volitional intentions to act, and controlling climate involves interpersonal behaviors aiming

to enforce specific ways of thinking and behaviors (Bartholomew, Ntoumanis, & Thøgersen-Ntoumani, 2009; Reeve & Jang, 2006). Perceptions of autonomy-supportive environment result in increased autonomous motivation and adaptive outcomes from activity involvement, whereas controlling climates elevate levels of controlling motivation and maladaptive outcomes (Bartholomew et al., 2009).

A fundamental element of the hierarchical model of intrinsic and extrinsic motivation is that motivation distinction exists in global, contextual, and situational levels of generality (Vallerand, 1997, 2007). In the TCM, motivation is addressed mostly at the contextual level, which reflects motivation in specific life contexts such as school-based PE and LTPA. An important corollary of the model is that motivation from one context can be transferred into motivation in another similar context at the same level of generality (Vallerand & Ratelle, 2002). For instance, intrinsic motivation in PE can be transferred to intrinsic motivation in competitive sport and LTPA contexts. These contexts can be considered similar because they involve the provision of physical activity.

The third theoretical approach that has been incorporated into the TCM is the theory of planned behavior. This theory has been widely used to explain the decision-making process in volitional behaviors (Armitage & Conner, 2001). Behavioral intention is considered the key variable of the model and the most influential predictor of behavior. Intentions correspond to an individual's willingness and determination in engaging in a specific behavior and are largely influenced by social cognition constructs, such as attitudes, subjective norms, and perceived behavioral control (PBC). Attitudes reflect the positive or negative evaluations toward the behavior associated with expectations about specific and desired outcomes. Subjective norms describe the significant others' evaluation of the behavior and the pressure posited to the individual to become involved in the behavior. Finally, PBC indicates the individual's self-efficacy beliefs in performing the behavior (Ajzen, 2002; Webb & Sheeran, 2006).

There is growing evidence on the integration of these approaches. From a theoretical viewpoint, an integration of theoretical approach has been proposed in recent developments to provide a more comprehensive understanding of human behavior. In the integrative model (Fishbein, 2009) and theory of triadic influence (Flay, Snyder, & Petraitis, 2009), a sequence through which distal variables influence proximal variables has been proposed, and these influence

behavior. More specifically, Fishbein and Ajzen (2010) argued that planned behavior theory variables are heavily influenced by motivation-related beliefs, such as those described in self-determination theory. In fact, Hagger, Chatzisarantis, and Harris (2006) indicated that they mediate the effect of motivation-related variables on behavioral intentions. This integration was further confirmed in a recent meta-analysis (Hagger & Chatzisarantis, 2009).

The Trans-Contextual Model

All abovementioned theories contribute to the formation of the TCM (Hagger, 2009). Self-determination theory (Deci & Ryan, 1985) provides the concept of motivational regulations and describes the effect of social environment on the formation of these regulations. The possibility of transferring motivation from one setting to a similar one at the same level of generality was derived from the hierarchical model (Vallerand, 1997, 2007). Finally, the process through which motivation influences actual behavior is fully described in the theory of planned behavior (Ajzen, 1985, 2002). The basic premises of the model indicate that an autonomy-supportive climate in PE will result in autonomous motivation in PE, which in turn will produce autonomous motivation in LTPA. Autonomous motivation in LTPA will positively influence intentions toward LTPA and actual LTPA through the effect of social cognitive variables, such as attitudes, subjective norms, and PBC (Barkoukis & Hagger, 2013; Hagger & Chatzisarantis, 2009; Hagger et al., 2003).

The TCM has received extensive support in PE and LTPA contexts. Shen, McCaughtry, and Martin (2007, 2008) investigated and verified the mediating role of the variables of the theory of planned behavior on the autonomy-supportive climate–LTPA relationship. Hagger et al. (2003) confirmed the hypotheses in regard to the model in a sample of high school students. Also, Hagger, Chatzisarantis, Barkoukis, Wang, and Baranowski (2005) and Hagger et al. (2009) cross-culturally supported most of the hypotheses in regard to the model in high school students from the United Kingdom, Greece, Poland, Singapore, Finland, Estonia, and Hungary. Although some minor culture-specific variations were found in some relationships tested, the pattern of relationships was consistent across samples with different cultural backgrounds. Hagger and Chatzisarantis (2009) further extended the model by examining the effect of parents' and peers' autonomy support on the formation of autonomous motivation. They reported a significant but weak effect of parents'

and peers' autonomy support on LTPA motivation, highlighting the important role of school PE in the development of LTPA behavior. Furthermore, Barkoukis, Hagger, Lambropoulos, and Tsorbatzoudis (2010) showed that psychological need satisfaction in secondary PE can mediate the effect of autonomy support in PE and LTPA and provided further evidence on the psychological mechanism through which teacher-initiated motivational climate can influence LTPA.

The aforementioned studies provide strong empirical support for the TCM. However, in most of the existing research on TCM and LTPA in the school PE context, the samples were adolescents aged 14 years or older, and there is a dearth of related studies among younger populations. As the World Health Organization (2013) has recommended, children should engage in daily extracurricular physical activities as doing so will prevent the onset of childhood and adolescent obesity, will reduce the risk for diabetes metabolic syndrome in the short and in the longer term, and can sustain healthy lifestyles through adulthood. Given the developmental differences within the elementary/preadolescent school population, and given the differences in the curricula of elementary and secondary PE lessons (Klein & Hardman, 2008), it is important to extend the investigation of the TCM in elementary school PE.

Based on past literature in secondary education and theoretical predictions, we assumed that motivational regulations in PE would predict their respective regulation in LTPA (H1). Regulations that are close in the self-determination continuum may have a significant effect on the dependent regulation. All other regulations were assumed to have a neutral effect. Autonomous regulations in LTPA were expected to have a positive effect on intentions, whereas controlling regulations a neutral or negative effect (H2). The effect of LTPA motivational regulations on intentions was assumed to be mediated by attitudes, PBC, and subjective norms (H3). Actual participation in LTPA was not measured. This decision was made having in mind the age of the students in the study. Pupils at this age heavily rely on their parents for transportation to and from a sport facility. Hence, it is possible that the pupils of the study could develop high intention toward LTPA but not exhibit behavior for reasons beyond their control.

Method

Sample

The sample of the study consisted of 241 pupils (males = 128, females = 113; $M_{\text{age}} = 11.52$, $SD = .51$) recruited from three coeducational elementary schools in an urban city of Northern Greece. Pupils were attending the fifth and sixth grade. A stratified sampling approach was used to randomly select three school units. The schools were selected from the official list of schools provided by the Ministry of Education. Based on the location of the selected schools and the description of school principals, schools were considered to be typical coeducational schools including students of middle socioeconomic status.

Research Design

A two-wave prospective design was adopted. In the first wave (time one), participants completed self-report measures of autonomous motivation in a PE context (Hagger et al., 2003), and in the second wave, one week later, they completed a questionnaire including measures of the theory of planned behavior variables (Ajzen, 1985) and autonomous motivation in an LTPA context (Mullen, Markland, & Ingledew, 1997). The week between the first and second wave was used to minimize the amount of error variance that could be attributed to the use of similar measures of motivational regulations in PE and LTPA contexts (Hagger & Chatzisarantis, 2007). The items of the measures were simplified and adapted to elementary school students. Two elementary school PE teachers read the questionnaire and commented on the face validity and comprehension of the items.

School principals of the selected schools were contacted and permission was granted. Parental consent was obtained via a pre-print form explaining the aim and procedures of the study delivered to parents by their children. Parents who did not wish their child to take part in the study should return the form signed. No signed forms were returned to the investigators. Data were collected in quiet classroom conditions under our supervision. During completion, oral and written instructions were provided to pupils to enhance comprehension of the measures. Pupils were informed on their right to withdraw at any time of questionnaire completion, and they were reassured on the anonymity and confidentiality of their responses. The same procedure was followed in both data collection waves. Questionnaires were matched using participants' birth date, gender,

class, and school. Two weeks prior to the scheduled questionnaire administration, the PE teachers of the two schools were unexpectedly replaced. Thus, we decided not to use the data pertaining to perceptions of teachers' autonomy support as they may not accurately reflect the effect of motivational climate on the tested variables.

Measures

Autonomous motivation in physical education. A modified version of Ryan and Connell's (1989) perceived locus of causality scale was used to measure autonomous motivation in PE. The scale comprises eight items measuring four types of motivation (two items per motivational regulation): *intrinsic motivation* (e.g., "I participate in physical education because it is fun"), *identified regulation* (e.g., "I participate in physical education because I value physical education"), *introjected regulation* (e.g., "because I will feel ashamed if I do not do physical education"), and *external regulation* (e.g., "I participate in physical education because important others want me to do physical education"). Responses were anchored on a 4-point scale ranging from 1 (*not true at all*) to 4 (*very true*).

Autonomous motivation in leisure time. The Behavioural Regulation in Exercise Questionnaire developed by Mullen et al.'s (1997) was used to measure autonomous motivation in a leisure-time context. Participants responded to the stem, "Why do you participate in active sports and/or vigorous physical activities in your spare time?" followed by the four motivational regulations. The questionnaire consisted of 15 items used to measure intrinsic motivation (four items; e.g., "I exercise because it is fun"), identified regulation (four items; e.g., "I exercise because it is important to make the effort"), introjected regulation (three items; e.g., "I exercise because I will feel guilty if I do not"), and external regulation (four items; e.g., "I exercise because others say I should"). Participants responded on a 7-point Likert scale ranging from 1 (*not true at all*) to 7 (*very true*). Internal consistency coefficients were satisfactory for intrinsic motivation and identification dimension, but low for introjected and external regulations (Table 1). Both regulations were retained in subsequent analyses, but respective findings should be treated with caution.

Table 1
Descriptive Statistics of Variables

Variable	Cronbach's α	<i>M</i>	<i>SD</i>
PE Intrinsic Motivation	–	3.56	.64
PE Extrinsic Regulation	–	2.97	.79
PE Introjected Regulation	–	2.79	.85
PE Identified Regulation	–	3.59	.61
PA Intrinsic Motivation	.68	6.11	1.06
PA Extrinsic Regulation	.50	3.15	1.45
PA Introjected Regulation	.40	4.25	1.53
PA Identified Regulation	.68	5.96	1.03
Intentions	.65	5.62	1.39
Attitudes	.89	6.36	.93
Perceived Behavioral Control	.76	5.62	1.17
Subjective Norms	.31	4.20	1.57

Note. PE = physical education; PA = physical activity. For scales with two items, Cronbach α was not estimated.

Intentions. Three items were used to measure intentions toward LTPA (e.g., “I am determined to participate in leisure-time physical activities in the next three weeks...”). Responses were provided on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Attitudes. Attitudes were assessed with the stem proposition, “Participating in active sports and/or vigorous physical activities during my leisure time in the next three weeks is...” followed by five 7-point semantic differential scales with the bipolar adjectives *bad–good*, *harmful–beneficial*, *not enjoyable–enjoyable*, *useful–useless*, and *boring–interesting*. The mean score was calculated, with higher scores reflecting more positive attitudes toward LTPA.

Subjective norms. Subjective norms were assessed using two items (e.g., “My parents, teachers, and friends think that I should take part in physical activities during my leisure time in the next three weeks”) on 7-point scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). A mean score was computed with higher scores reflecting more favorable beliefs of significant others toward LTPA.

Perceived behavioral control. Three items were used to measure PBC (e.g., “I feel in complete control over whether I take part in physical activities during my leisure-time in the next three weeks”). Responses were anchored on a 7-point Likert scale ranging from 1 (*no control*) to 7 (*complete control*). A composite score was computed with higher scores indicating higher control over participating in LTPA.

Results

Preliminary Analyses

Means, standard deviations, and internal consistency coefficients are shown in Table 1. Extrinsic and introjected regulations in LTPA revealed low internal consistency. Because these are important in testing the hypotheses of the study, they were retained in the analyses. However, findings pertaining to these regulations should be interpreted and treated with caution. The analysis of correlation revealed moderate relations among the variables (Table 2).

Effect of PE Motivation on LTPA Motivation

A linear regression analysis was used to test the effect of PE motivational regulations on the respective LTPA regulations. With respect to LTPA intrinsic motivation, the results of the analysis indicated a significant effect explaining 13.5% of the variance, $F(4, 240) = 10.41, p < .001$. PE intrinsic motivation was the only significant predictor, $b = .26, p < .001$. Similarly, a significant effect was found regarding the prediction of LTPA extrinsic regulation, $\text{adj } R^2 = 14.0, F(2, 240) = 10.76, p < .001$. PE extrinsic and introjected regulations were found to have a significant predictive effect on LTPA extrinsic regulation, $b = .20, p < .01$, and $b = .19, p < .01$, respectively. The results of the regression analysis regarding LPTA introjected regulation indicated a significant predictive effect from PE motivational regulations, $\text{adj } R^2 = 14.7, F(2, 240) = 11.36, p < .001$. Only PE introjected regulation emerged as a significant predictor, $b = .26, p < .001$. Finally, similar findings were found with respect to identified regulation. PE motivational regulations had a significant effect, $F(4, 240) = 6.44, p < .001$, explaining 8.3% of the variance. PE identified and external regulations were found to be significant predictors, $b = .16, p < .05$, and $b = .14, p < .05$, respectively.

Table 2
Correlation Analysis Among the Variables

Variable	2	3	4	5	6	7	8	9	10	11	12
1. PE Intrinsic Motivation	.07	.03	.23**	.30**	.02	.08	.02	.09	.08	.12*	.01
2. PE Extrinsic Regulation		.39**	.27**	.20**	.31**	.26**	.24**	.07	.05	.09	.16**
3. PE Introjected Regulation			.40**	.20**	.32**	.35**	.23**	.11	.12	.12	.25**
4. PE Identified Regulation				.24**	.24**	.26**	.22**	.21**	.11	.09	.11
5. PA Intrinsic Motivation					.28**	.34**	.58**	.45**	.44**	.41**	.23**
6. PA Extrinsic Regulation						.61**	.35**	.24**	.18**	.18**	.45**
7. PA Introjected Regulation							.46**	.37**	.29**	.28**	.32**
8. PA Identified Regulation								.54**	.47**	.52**	.34**
9. Intentions									.44**	.61**	.27**
10. Attitudes										.50**	.19**
11. Perceived Behavioral Control											.30**
12. Subjective Norms											

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

Effect of LTPA Motivation and Social Cognition on Intentions

A hierarchical regression was used to test the effect of LTPA motivational regulations on intentions and the effect of social cognition, namely, attitudes, PBC, and subjective norms, on intentions. In the first step of the analysis, the LTPA motivational regulations were entered and significantly predicted intentions, $F(4, 239) = 30.04$, $p < .001$, explaining 33.5% of the variance. Intrinsic motivation, identified regulation, and introjected regulation were found to have a significant effect on intentions, $b = .17$, $p < .01$; $b = .39$, $p < .001$; and $b = .16$, $p < .05$, respectively. In the second step, social cognition variables for the theory of planned behavior were entered. The addition of social cognition improved the predictive ability of the model, $\text{adj } R^2 = 46.2$, $F(7, 239) = 30.31$, $p < .001$, R^2 change = 13.2%. With respect to social cognition variables, only PBC was found to have a significant effect on intentions, $b = .40$, $p < .001$. The effects of intrinsic motivation and introjected regulation were suppressed and turned out to be nonsignificant, whereas the effect of identified regulation was lowered but remained significant.

Mediating Role of Social Cognitions

These findings of the hierarchical regression analysis imply a positive mediating effect of PBC on LTPA motivation–intentions relationship. Multiple mediation analysis (Preacher & Hayes, 2008) was used to test for the mediating role of PBC. Bias-corrected confidence intervals (95% CI) for standard errors were estimated using bootstrapping (1,000 resamples). Three multiple mediation models tested if (a) PBC mediated the relationship between LTPA intrinsic motivation and intentions, (b) PBC mediated the relationship between LTPA introjected regulation and intentions, or (c) PBC mediated the relationship between LTPA identified regulation and intentions. The first mediation model showed that PBC partially mediated the effect of intrinsic motivation on intentions, $\beta_c = .590$, $p < .001$, $\beta_c = .309$, $p > .001$; $z_{\text{PBC}} = 5.68$, $p < .001$. Similarly, the second mediation model showed that PBC partially mediated the effect of introjected regulation on intentions, $\beta_c = .342$, $p < .001$, $\beta_c = .197$, $p > .001$; $z_{\text{PBC}} = 4.27$, $p < .001$. Finally, a partial mediation effect was also evident in the third mediation model regarding the identified regulation–intentions relation, $\beta_c = .750$, $p < .001$, $\beta_c = .429$, $p > .001$; $z_{\text{PBC}} = 6.14$, $p < .001$.

Discussion

We assessed the effect of motivation in elementary school PE on LTPA motivation and decision-making processes with regard to LTPA participation. The results of the analyses indicated that motivational regulations in PE predicted the respective LTPA motivational regulations. In addition, LTPA motivational regulations predicted intentions toward physical activity, and this effect was partially mediated by PBC.

More specifically, the results of the analyses confirm the first hypothesis, as PE motivational regulations predicted LTPA regulations. These findings are in agreement with past research and theory (Hagger et al., 2003; Vallerand, 2007) and indicate that the transfer of motivation between contexts is manifested as early as age 10 (i.e., fifth grade). This is an important contribution to the extant research because it implies that 10-year-olds have already developed motivational schemata in several related contexts. Thus, elementary school PE could influence the formation of LTPA motivation, but this assumption should be examined in future research.

Each PE motivational regulation predicted the respective LTPA motivational regulation. Past research within the TCM has largely relied on the measurement of RAI and the transference of self-determination from the context of PE to LTPA (Hagger et al., 2003; Hagger et al., 2005). The present study indicates that each motivational regulation can influence the respective LTPA regulations. Controlling motivational regulations in PE could produce controlling motivation in LTPA. These findings imply that fostering controlling motivation in PE will probably result in the development of maladaptive motivation in LTPA. So far, past evidence has heavily relied on the development of autonomous motivation to enhance self-determination (Pihu, Hein, Koka, & Hagger, 2008). However, according to self-determination theory and past research, there is evidence that sport participants may endorse simultaneously autonomous and controlling motivation (Vlachopoulos, Karageorghis, & Terry, 2000). The use of specific strategies to decrease controlling motivation may further enhance self-determination. PE teachers should avoid using strategies, such as uttering solutions and directives, making ought-to and deadline statements, asking controlling questions, and criticizing the student to ensure the decrease of controlling motivation (see Bartholomew et al., 2009; Reeve & Jang, 2006).

The findings partially support the second hypothesis of the present study. Autonomous motivational regulations in LTPA had a positive effect, but contrary to expectations, introjected regulation also had a positive effect on intentions. The findings pertaining to autonomous motivational regulations are consistent with past research in secondary education. The positive effect on intentions demonstrates that elevated levels of autonomous motivation are more likely to produce positive intentions toward physical activity. These findings are also in line with Vallerand's (2007) contentions that the effects of contextual-level motivational constructs can influence more proximal, situational-level constructs.

Although introjected regulation is considered as an extrinsic motivation, it reflects the first step in the internalization process of the behavior (Vansteenkiste, Soenens, & Vandereycken, 2005). Past evidence on self-determination theory has shown that introjected regulation may have positive or negative influence on outcomes of behavior (Gillison, Osborn, Skevington, & Standage, 2009). In the present study, introjected regulation acted as an adaptive motivational type. This might be ascribed to the age of the participants. It is possible that younger children cannot distinguish the internal and external reasons that may apply pressure to them and categorize them both as internal pressure. If this is the case, introjected regulation in young children may act as an autonomous motivational type and children participate in an activity out of their own choice to release their internal pressure.

Only PBC was found to mediate the effect of LTPA motivational regulations on intentions. Prior research with high school students has shown attitudes and subjective norms to also mediate this relationship (Hagger et al., 2003). These findings imply that in childhood the sense of control over behavior is an important determinant of the decision to involve in this behavior. It is possible that children understand that although they may hold favorable views toward a behavior and the environment is supportive, the crucial aspect determining behavior initiation is the perception of their ability to engage in the behavior. Thus, students with positive perceptions about their ability to be involved in LTPA benefit from the formation of adaptive motivational regulations and develop higher intentions for participation in LTPA.

Conclusions, Limitations, and Future Directions

Overall, the present study supports the hypotheses in the TCM in a sample of elementary school children. Motivational regulations in

PE predicted the respective regulations in LTPA, which in turn positively predicted intentions toward physical activity participation. The latter effect was mediated by PBC. The present study is the first study in which the TCM has been tested in elementary school. This is an important contribution to the literature, having in mind that the age children initiate out-of-school physical activity participation has decreased and that there are huge developmental differences between elementary school and high school students. Nevertheless, the present study has several shortcomings. First, because of an unfortunate incident (PE teachers removed), perceptions of motivational climate were not included in the analyses and a complete test of the TCM was not possible. The replacement of the PE teachers might have confused students' responses, with some responding having in mind the old teacher and some the new one. Thus, there would have been no consistency in the measurement of perceptions of motivational climate, and this could have jeopardized the findings of the study. In future studies, researchers should incorporate a measure of perceptions of motivational climate to allow a complete test of the model. Another limitation of the study concerns the assessment of the constructs of the model in elementary school. Although a careful adaptation of the measures for elementary school students was made, two subscales had low internal consistency. Findings pertaining to these constructs should be treated with caution. Researchers should further investigate the validity and reliability of the instruments. Notwithstanding these limitations, the present study demonstrates an important mechanism of how motivation in elementary school PE can influence LTPA.

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PEDAGOGY - ELEMENTARY
PHYSICAL EDUCATION

Xbox Kinect Gaming Systems as a Supplemental Tool Within a Physical Education Setting: Third and Fourth Grade Students' Perspectives

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Abstract

Literature indicates that technology, including exergaming, is popular among adolescents and can be used as a supplemental tool in the physical education classroom. Therefore, the purpose of this study was to examine third and fourth grade students' perceived enjoyment and exertion levels toward exergaming in relation to traditional physical education. The participants included 148 third and fourth grade elementary students. Each student completed two surveys (10 items each): one after a traditional PE lesson (gym) and one after participating in a lesson taught in an exergaming lab (MKR). Each survey consisted of two parts: seven enjoyment questions and three perceived exertion questions. Using a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree), students marked responses to reflect their enjoyment toward and perceived exertion levels for each setting of physical education. The results indicate students enjoyed the MKR (Mean Rank = 75.75) significantly more than the traditional gym (Mean Rank = 49.15) setting,

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$z = -4.53, p < .001$. However, the students felt they worked harder in the gym (Mean Rank = 73.21) compared to the MKR (Mean Rank = 51.15), $z = -4.11, p < .001$. With this study, physical educators will be exposed to the implications of integrating exergaming into a physical education environment.

The impact of technology on society, and more specifically children, is prodigious. The child of the 21st century was born into a world immersed in technology and all its advantages and disadvantages. The copious amounts of day-to-day technologies to which school-aged children have access and routinely consume are astounding. Children are instinctively drawn to multiuse technologies such as smartphones that include text messaging, FaceTime, social networking and media, music, and GPS. Furthermore, tablets and e-readers, interactive television with Internet capabilities, personal computers, SMART Boards, video gaming systems, and the relatively new genre of exergaming have inundated the technology markets.

Children are becoming unhealthier throughout each generation. Over the last three decades, the obesity rate has nearly tripled, rising to over 9 million obese children and adolescents (Ogden & Carroll, 2010). Russell and Newton (2008) found that the disconcerting U.S. obesity epidemic trends point toward children's lack of activity. Additionally, the societal issue of technology overuse among children is concerning for most. Researchers have suggested that screen time, which includes television, computer, and video game usage, is another perpetrator of the obesity epidemic (Russell & Newton, 2008). Not long ago parents had to step outside on the porch to call their children in for dinner, whereas today parents step into the other room to find their children sitting in front of the television or the computer. A sedentary lifestyle, compounded with the attractiveness of video games, creates a perfect storm for the ongoing battle against obesity. This can be problematic for physical education (PE) teachers as the main goal of PE is to get students physically active.

The video game industry has been gathering momentum through the popularity of interactive video game technology or IVGT. Video gaming has been an entertainment staple for years, especially among the younger generations. The "iGeneration" (Rosen, 2011), the children entering today's elementary schools, is more conversant with technology than any previous generation. At a TED Conference in 2010, Jane McGonigal reported that an average adolescent will spend 10,000 hr playing video games before turning 21. This is the

same amount of time an adolescent will spend in class from middle school to high school combined. With technology becoming more prevalent in the world, physical educators need to use any and all resources to reach students and encourage physically active lifestyles. Infusing technology into the gyms of today is a necessity to reach the learners of the future.

Recent advancements in the technology field have produced a new genre dubbed exergaming, which has burst on the scene, permeating homes and schools. As defined by Staiano and Calvert (2011), “Exergames interpret a player’s bodily movements as inputs associated with specific meanings for game play, translating movement in three-dimensional space onto the two-dimensional screen” (p. 93). Since the 1980s, physical educators have used primitive technological tools such as stationary bikes connected to video game consoles, requiring the player to pedal while playing the game (Staiano & Calvert, 2011). However, video games have not been traditionally used in the PE profession because of the sedentary element. This sedentary factor is not present in exergaming as the user is required to be up and active. This new exergaming technology promotes a healthy, active lifestyle (Silverstone & Teatum, 2011) and is attributed to debunking negative connotations closely associated with video gaming and the obesity epidemic, and the tech-savvy child may relate better to physical activity through the use of exergaming as a fun and interactive medium.

There are multiple benefits to physical educators incorporating exergaming into their classrooms. In 2008, Russell and Newton discovered that by using IVGT, exercise could be beneficial for students’ extracurricular activities and boost student participation. Although exergaming is a relatively new tool for the PE profession, it seems to be gathering steam and could be helpful in the goal of becoming more active as a society. If used appropriately, exergaming could benefit students’ physical, socioemotional, and cognitive health (Exner, 2010). Fogel, Miltenberger, Graves, and Koehler (2010) revealed that exergaming demonstrates potential as a PE tool because it is simple to apply, it is easy for the PE teacher to incorporate, and children start to engage in physical activity immediately. Exergaming can also provide students with exposure to nontraditional activities such as adventure racing, white-water rafting, golf, or tennis to which they may not otherwise be privy (Daley, 2009). With exergaming, PE teachers can get students up and engaged with these virtual movement activities.

Being marketed for its enjoyment factor, exergaming has affective benefits (Russell & Newton, 2008). Therefore, it is important to explore students' perceptions in PE as perceptions are a determinant to children choosing certain physical activities. Children find challenging activities to be interesting and enjoyable, which in turn leads to more participation. Students will find an activity enjoyable by either previous experience or perceived experience of the activity. The more success students experience during a given activity, the more likely they are to enjoy the activity. Enjoyment then plays a vital role in long-term participation in physical activity. Thus, students will need to experience success with an activity, really enjoy the activity, or both to continue with future engagement (Cairney et al., 2012). Combining the best of both worlds, play and technology can foster enjoyment that usually results in the student working hard, tiring out, and expending lots of energy during PE. Even when some students perceive physical activity as a negative, exergaming allows teachers to safely monitor and develop the physical fitness of students while infusing technology they enjoy (Medina, 2008). Additionally, there is the possibility for student behavior and attendance to improve (Castelli, Hillman, Buck, & Erwin, 2007). Therefore, if the use of exergames can improve aspects of PE such as discipline, attentiveness, rowdiness, or attendance, it should be seriously considered for adoption into a school's PE curriculum.

How teachers perceive video games as an instructional tool is another factor to consider when exploring the use of exergaming. Professionals in the field of PE could seize the opportunity to enhance the depth of their toolbox by using technology trends that are popular with youth today. Zimmerman and Fortungo (2005) suggested teachers who are unfamiliar with or do not appreciate video games will not use them to benefit their classroom. Additionally, Kenny and McDaniel (2011) affirmed that teachers who perceive video games as irrelevant are less likely to implement them into their classroom. If teachers do not see the importance of technology, specifically exergaming within an educational setting, technology will not be effectively implemented into a school's curriculum. However, Fogel et al. (2010) found teachers strongly agree that students can benefit from exergaming, that there is an opportunity to develop skills, and that behavior problems are reduced.

Investigation of the advantages and disadvantages of exergaming compared with traditional exercise is warranted. There is a need for further investigation into the attitudes and perceptions of children on exergaming as a physical activity (Witherspoon-Hansen,

2009). Therefore, the purpose of this study was to examine students' perceptions regarding exergaming in the PE setting at their school. More specifically, students' perceptions of PE were compared in the traditional setting (gym) versus an exergaming lab (Microsoft Kinect room or MKR).

Methods

Two PE settings were used in the study: a traditional gym setting and an exergaming lab (MKR). A survey was given following each setting to examine enjoyment and perceived exertion differences between the settings. A Wilcoxon test was used to analyze the differences in student responses to the surveys.

Participants

The participants for this study included 148 third and fourth grade students from a rural elementary school in Northwest Arkansas. The student participants included 71 third graders (34 female, 37 male) and 77 fourth graders (36 female, 41 male). The sample was drawn from a K-4 elementary school with a population of 649 students, 96% of whom were Caucasian and 27% of whom were enrolled in free and/or reduced-price lunch. A consent form, approved by the school district's administrators and by the researchers' university institutional review board, was sent home to the parents and returned back to school with one parent signature of consent to participate.

Procedure

Students entered each 30-min PE setting and then sat down for a brief introduction of the lesson objectives for the day. While in the MKR, students competed in track and field activities of the Kinect Sports video game. Two students were assigned to one of the 12 Microsoft Kinect gaming consoles in the MKR, and the students started the game after they arrived at their station. While in the traditional gym setting, students participated in obstacle course relays consisting of running, jumping, and hurdling activities. The activities between the settings were carefully aligned to help alleviate bias toward activities on the students' part. During the class, the teacher stopped individual students occasionally to provide assistance or feedback.

Participants were given paper surveys during the last 5 min of a traditional gym setting and the MKR. The surveys were administered on two occasions during the same week and as close to the

previous setting as possible. The schedules were random, allowing some students to be in the gym first and others to be in the MKR first.

Instruments

A survey developed by faculty from our institution for a separate study was used as a guide in creating the survey for this study. As a result, a survey was created with questions about enjoyment and exertion levels of students while in a traditional gym setting. The same survey was used for the MKR, but the word *gym* was replaced with the words *Kinect room* for the MKR survey. Each student survey consisted of 10 statements. The first seven statements were designed to measure student enjoyment of the PE setting, and the last three statements were designed to measure student perceived exertion level. The survey questions used can be found in Table 1. Finally, the surveys included a 5-point response scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

The 10 survey statements were randomly mixed and sent to a panel of five experts. The experts, averaging 18 years of experience in the field of PE, were asked to group like questions to ensure validity of the survey instrument. The panel of experts found the survey instrument to have sufficient validity. Four of the five PE experts grouped the three perceived exertion statements together (with the fifth expert excluding only one of those three statements), thus leaving the remaining seven statements to form the perceived enjoyment group.

A Cronbach's alpha was used to assess the internal consistency of the survey instrument. A Cronbach's alpha of .79 was found for the seven enjoyment questions of the survey. For the three perceived exertion questions of the student survey, a Cronbach's alpha of .60 was found, resulting in acceptable internal consistency.

Statistical Analysis

SPSS Statistics 20 software was used to analyze the data. Because the assumption of normality was violated, a nonparametric test was selected for this study. Consequently, a Wilcoxon test was employed to distinguish group differences in the enjoyment statements following the MKR and the gym. Likewise, the group differences from the perceived exertion statements were assessed using the same procedure. Surveys from students who did not participate in both settings were not considered in the analysis.

Results

A Wilcoxon test was conducted to evaluate the mean rank differences of student perceived enjoyment and exertion levels while participating in the gym versus the MKR. The students enjoyed the MKR (*Mean Rank* = 75.75) significantly more than the traditional gym (*Mean Rank* = 49.15) setting, $z = -4.53, p < .001$. However, the students felt they worked harder in the gym (*Mean Rank* = 73.21) compared with the MKR (*Mean Rank* = 51.15), $z = -4.11, p < .001$. Statistics for comparing individual questions between the two settings— z -scores, significant differences, positive ranks, mean ranks, means, and standard deviations—are displayed in Table 1.

Discussion

Minimal research was found concerning the *affective* benefits of exergaming. Therefore, students' perceptions of PE in the traditional PE setting (gym) versus the MKR were compared in this study. There are some notable items in Table 1. First, elementary students enjoy PE no matter the setting. Those who have been around an elementary school setting can identify with this fact. Furthermore, this study reveals students like the MKR, they look forward to PE days in the MKR, and they feel their friends enjoy the MKR more than the gym. As previously discussed, youth today are engrained in technology and video games. It stands to reason, when given the choice of physical activity with or without technology, they choose with technology. There are additional findings to consider in Table 1. Students believed they worked equally hard in the two settings. However, students felt more fatigued while in the gym. When people enjoy an activity, they may not mind, or even realize they are, working hard. The findings of this study may be applicable to that phenomenon. Consequently, it would be interesting for future researchers to explore aerobic benefits of an MKR setting compared with those of the traditional gym. This would include exploring physiological data, such as heart rate, as it relates to technology in PE. Investigation into such an experience could add relevance to using such technology within elementary PE. Furthermore, as a result of the homogeneous sample of the study, the affective benefits of exergaming among ethnic, socioeconomic, and age (e.g., secondary schools) populations is warranted. Last, prior to conducting the study, students with disabilities were informally observed interacting with a Microsoft Kinect gaming system. Thus, exploring an MKR setting within adapted PE could be beneficial as well.

Table 1
Differences in Individual Questions Comparing Settings (MKR vs. Gym)

Question	M (N)	SD	Mean Rank (P.R.)	Ties	z	p
I enjoy PE in the MKR	4.60 (148)	.603	44.11 (56)	62	-2.67	0.008*
I enjoy PE in the gym	4.32 (148)	.941	42.37 (30)			
I am good at PE in the MKR	4.60 (148)	.603	41.19 (54)	68	-3.91	< .001*
I am good at PE in the gym	4.30 (145)	.828	33.85 (23)			
I have good sportsmanship in the MKR	4.70 (148)	.635	34.05 (40)	83	-2.02	0.044*
I have good sportsmanship in the gym	4.55 (148)	.722	31.32 (25)			
I think my friends like PE in the MKR	4.61 (146)	.614	43.91 (64)	61	-5.61	< .001*
I think my friends like PE in the gym	4.05 (144)	.903	30.03 (17)			
I look forward to PE days in the MKR	4.37 (145)	.942	48.22 (56)	53	-3.16	0.013*
I look forward to PE days in the gym	3.97 (144)	1.158	37.98 (32)			
I would rather go to PE in the MKR instead of the gym	2.47 (147)	1.356	45.38 (45)	4	-1.22	0.222
I would rather go to PE in the gym instead of the MKR	2.65 (147)	1.428	52.13 (52)			
I want to participate in PE when in the MKR	4.60 (146)	.819	36.54 (36)	75	-0.22	0.824
I want to participate in PE when in the gym	4.59 (148)	.764	35.44 (35)			
I get tired in PE when in the MKR	3.20 (148)	1.378	55.30 (47)	30	-2.48	0.013*
I get tired in PE when in the gym	3.63 (148)	1.285	62.28 (71)			
I usually sweat in PE when in the MKR	3.64 (148)	1.315	41.65 (31)	42	-4.74	< .001*
I usually sweat in PE when in the gym	4.32 (146)	1.023	57.11 (73)			
I work hard in PE when in the MKR	4.76 (146)	.542	24.50 (24)	97	0.00	1.00
I work hard in PE when in the gym	4.76 (147)	.544	24.50 (24)			

Note. MKR = Microsoft Kinect room; P.R. = number of positive ranks. Adding together the number of positive ranks for each setting with the number of ties equals the total (N) for the paired statements.

* $p < .05$.

This study had several noteworthy characteristics. The study had a sufficient sample size, a good internal consistency for the seven enjoyment questions, an acceptable internal consistency for the three exertion questions, and good validity within the field. However, the results for the exertion portion of the survey were on the lower end of the acceptable range for internal consistency. After the final data set was investigated, the distributions showed symmetry but were negatively skewed, violating the assumption of normality for a distribution. This was because few questions were answered strongly disagree or disagree for either setting. Last, replicating identical movements between the settings can be difficult. However, the activities used in the gym and MKR fell within the same state standards.

“Old school” PE is just that, old. No more dodgeball or climbing the rope in front of the entire class. The majority of children still appreciate PE in all settings. Similarly, children enjoy video games. Thus, incorporating technology into PE is essential in connecting with today’s children. Ultimately, this study indicates exergaming can be used in the PE profession with positive results as it taps into the interest of the current generation of students.

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PHYSICAL ACTIVITY

Gender Differences Regarding Motivation for Physical Activity Among College Students: A Self-Determination Approach

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Abstract

Previous research has shown a decline in physical activity (PA) across college years, females being less physically active compared with males. Scholars have suggested studies to understand gender differences in PA and to examine motivational processes to facilitate college students' PA. Grounded in self-determination theory, the purpose of this study was to investigate the relationships between college students' exercise motivation and weekly PA participation. The study included 96 college students (33 males, 63 females, aged 18 to 24) in a metropolitan college. Findings confirmed a significant gender difference, with males responding more positively concerning intrinsic motivation ($t = 3.40, p = .001$). In addition, through an analysis of variance, we found level of PA had a significant interaction with intrinsic motivation, $F(1, 94) = 9.45, p < .001$, and identified regulation, $F(1, 94) = 6.45, p = .003$. Furthermore, least

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significant difference tests showed that the differences occurred between inactive and moderately active groups and inactive and very active groups (p values between .011 and .000). Results from this study concerning motivation for PA with this age group support the premise that self-determined motivation is strongly linked to higher PA participation. The findings of this study provide a better understanding of how to assist college-aged students to live a more physically active and healthy lifestyle.

Although a multitude of health benefits have been linked to regular participation in physical activity (PA; Miles, 2007), a majority of Americans do not meet the recommended PA guidelines (Haskell et al., 2007; Troiano et al., 2008). Regular PA has been reported to decline in adolescence, the steepest decline occurring before adulthood (Gordon-Larsen, Nelson, & Popkin, 2004). This lack of PA has partially contributed to the current obesity epidemic, with more than one third of Americans being obese (Ogden, Carroll, Kit, & Flegal, 2012). Although the benefits of regular PA have been well reported (Strong et al., 2005), motivating individuals to initiate and maintain a program of regular PA remains a critical and unmet challenge in 21st century United States.

PA is “any bodily movement produced by skeletal muscles that result in energy expenditure” (Caspersen, Powell, & Christenson, 1985, p. 129). It involves elements of quality, intensity, frequency, and duration of action (Shephard, 2003). Based on the national recommendations, Americans should engage in daily PA of at least 60 min (U.S. Department of Health and Human Services, 2008). However, in a recent meta-analysis of 26 longitudinal studies on adolescent PA, Dumith, Gigante, Domingues, and Kohl (2011) reported that in 22 studies a decline in PA levels was found across ages 9 to 18 years, the decline being steepest between ages 15 and 18 (Caspersen, Pereira, & Curran, 2000). Similarly, convincing research evidence has shown that boys are more active in adolescence compared with girls (Currie et al., 2008). For instance, in the 2011 Youth Risk Behavior Surveillance System (YRBS), the Centers for Disease Control and Prevention (CDC, 2012) found gender differences between ninth and 12th grade students, with females being less engaged in PA compared with males. Furthermore, as these inactive adolescents enter college, they do little to change their PA habits (Gordon-Larsen et al., 2004).

A better understanding of motivation to engage in PA is logical. Self-determination theory (SDT) is one of the most prominent theories to explain human behavior in different life domains, including exercise (Deci & Ryan, 1985). In SDT, the individual's self-determination is affected by the extent to which a person's fundamental needs for *competence*, *autonomy*, and *relatedness* are fulfilled or satisfied. Competence reflects how a person's behavior is effective and how a person feels that he or she has adequate ability. Autonomy, in turn, represents a person's need to be the originator of his or her behavior and to control that behavior. The third need for relatedness reflects the necessity to feel a secure sense of belonging or connectedness to others. If these needs of autonomy, competence, and relatedness are met, they have a positive effect on an individual's well-being and quality of motivation (Deci & Ryan, 2000; Ryan & Deci, 2008).

In SDT, it is assumed that motivation occurs on a continuum from extrinsic to intrinsic motivation. An individual participates in an activity for extrinsic motivation when that activity is connected to the potential reward, such as wealth, grades, status, appearance, or ill-health avoidance. Intrinsic motivation comes from within the person's values, and the activity is innately rewarding to pursue because the person finds it enjoyable (Deci & Ryan, 1985, 2000). In SDT, it is suggested that the level of human autonomy increases toward the intrinsic motivation end of the continuum (Deci & Ryan, 2000). Intrinsic motivation represents the most self-regulated motive in the continuum, and it refers to engaging in an activity because of the pleasure and satisfaction derived from participation. Integrated regulation is the most internalized form of extrinsic motivation. It involves identifying the importance of behaviors, but also integrates those identifications with other aspects of self. Integrated regulations exist when people have fully accepted the identified behaviors by bringing them into harmony or coherence with other aspects of their goals and values. Identified regulation is the next regulation toward the extrinsic end in the continuum, and it occurs when the individual has recognized and accepted the underlying behavior of values or goals. In the continuum, the next regulation is introjected regulation, which determines motivational forces still internal but is influenced by esteem-based pressures to act. These can be, for example, avoidance of guilt and shame or concerns about self and others' approval. External regulation is the purest form of extrinsic

motivation, and it occurs if an activity is done because of external factors such as rewards, constraints, or fear of punishment. The lowest motive in the motivational continuum is amotivation, and it is a state in which people lack the intention to behave and thus lack motivation. Typical for amotivated individuals are feelings of incompetence, expectancies of uncontrollability, and performance of activities without purpose. In SDT, it is suggested that self-determined (intrinsic motivation and identified regulation) motivations are related to adaptive cognitive, affective, and behavioral responses, whereas non-self-determined (controlling; introjected regulation and extrinsic motivation) motivations correlate with maladaptive cognitive, affective, and behavioral consequences (Deci & Ryan, 2000).

These premises have been supported in numerous empirical studies. Maltby and Day (2001) reported intrinsically motivated undergraduate students to be more physically active and have better psychological well-being compared with extrinsically motivated undergraduate students. On the contrary, in a recent study examining college students' PA motivation, Egli, Bland, Melton, and Czech (2011) found that the most popular student motivation was extrinsic instead of intrinsic. Specifically, college students' key motives for exercise were to improve their health status (identified regulation) and ill-health avoidance (external regulation), followed by appearance (external regulation), strength and endurance (identified regulation), and weight management (external regulation). In a recent systematic review in which SDT-based exercise motivation studies were examined from 1960 to 2011, a consistent positive relationship was found between self-determined motivation (intrinsic motivation and identified regulation) and exercise adoption and maintenance (Teixeira, Carraça, Markland, Silva, & Ryan, 2012). Specifically, the results show consistent support for a positive relationship between more self-determined forms of motivation and exercise, with a trend toward identified regulation predicting initial/short-term adoption more strongly than intrinsic motivation and intrinsic motivation being more predictive of long-term exercise adherence. The literature is also consistent in that competence satisfaction and more intrinsic motives positively predict exercise participation across a range of samples and settings for college students (Gao, Podlog, & Harrison, 2012; Harkema, Dierker, Lankford, & Scholl, 2006; Sibley, Hancock,

& Bergman, 2013). Mixed evidence has been found with this age group concerning the role of other motives (e.g., health/fitness and body-related) as well as the specific nature and consequences of introjected regulation (Chung & Liu, 2013; Daley & Duda, 2006; Ferrari, Silva, & Petroski, 2012; Scott, Joyner, Czech, Munkasy, & Todd, 2009).

In previous research, gender differences have been found in college students' exercise motivation (Egli et al., 2011; Gao & Xiang, 2008; Gillison, Standage, & Skevington, 2006). Egli et al. (2011) found that males had a tendency to be more motivated by intrinsic factors, whereas females were more motivated by extrinsic factors. Males were more likely to mention enjoyment, challenge, social recognition, affiliation, competition, and strength and endurance as motivating factors for exercise, whereas females were more likely to state ill-health avoidance, maintain positive health, weight management, and appearance. Gao and Xiang (2008) reported that women tended to calorie watch and that positive affect (enjoyment) significantly decreased between the first minute of exercise and the minute before they reached their ventilator threshold. This results in women working out at a higher intensity and not enjoying exercising at the same rates as men. Finally, Gillison et al. (2006) studied motivation for PA of school-aged children ($M_{\text{age}} = 14.06$) and found that girls experienced greater social physique anxiety and perceived pressure from the media to lose weight. Girls were also less self-determined to exercise compared with boys, which the researchers noted may be a result of their negative body image due to external forces (media). Girls also perceived themselves to be overweight at a greater rate than did boys (43% and 26%, respectively), despite that there was no gender difference in the proportion of overweight individuals (19% boys, 20% girls). Not surprisingly, girls more often reported extrinsic exercise goals (weight control, body tone) than did boys.

This pattern of motivational gender differences to engage in PA continues into adulthood. González-Cutre, Sicilia, and Águila (2011) speculated that gender differences may be a result of women taking responsibility of fulfilling the household duties; frequently acting as the coordinator of the family life; and fulfilling a role of mother, wife, and housekeeper. Women entering the workforce have diminished leisure activity, whereas men's roles have stayed relatively the same, as have their amounts of leisure time spent in PA.

González-Cutre et al. confirmed that male participants were more satisfied in their leisure activities than were women, who reported less leisure time. In addition, women had stronger motivations to exercise because of health, physical condition, and well-being, whereas men's focus pertained to exercising for filling their leisure time and relaxing. Because men and women do not have the same amount of leisure time, women may not be able to enjoy the benefits of exercising that men do. As a result of limited time, women may exercise at a higher intensity to avoid ill-health.

In a recent meta-analysis of 27 studies on SDT investigations, Guérin, Bales, Sweet, and Fortier (2012) looked at studies in which the Behavioural Regulations in Exercise Questionnaire (BREQ) or BREQ-2 was used and reported that although there were varying scores between genders, the differences were not significant among the SDT regulations. Women had higher scores for introjected regulation, but there was no significant difference between men and women in intrinsic motivation scores, which was found in the previous four studies in the literature review (Egli et al., 2011; Gao & Xiang, 2008; Gillison et al., 2006; & González-Cutre et al., 2011). There are clearly discrepancies regarding how gender may affect individual motivation to exercise.

Purpose for the Study

Based on the evidence, there is consensus that young adults' PA participation declines from high school to college (Kilpatrick, Herbert, & Bartholomew, 2005). However, there is a lack of agreement on the relationship between motivation and PA levels of college students (Chung, & Liu, 2013). Although previous research has shown a strong positive relationship between intrinsic exercise motivation and PA adherence, inconsistent findings in regard to extrinsic forms of motivation as well as gender differences warrant further studies. Thus, the purpose of this study was to investigate the relationships between college students' exercise motivation and weekly PA participation. The first aim of the study was to examine gender differences in motivational regulations and PA participation. Based on previous research (Currie et al., 2008; Egli et al., 2011), we hypothesized males to be physically more active and intrinsically motivated compared with less active, extrinsically motivated females. Second,

we wanted to extend the current knowledge base regarding how differently physically active college students differ in their exercise motivation. Based on the tenets of the SDT (Deci & Ryan, 2000), we hypothesized physically active students to be more intrinsically motivated toward exercise compared with extrinsically motivated students. In addition, we assumed that amotivation would be higher within the inactive student group.

Method

Participants

The research sample ($n = 96$, $M_{\text{age}} = 20.76$, $SD = 1.69$) consisted of college students aged 18 to 24 years who attended the same university. There were 33 males (34.4%) and 63 females (65.6%), which is close to the university's demographics (39.9% and 60.1%, respectively). A survey research design was employed during this investigation using a convenience sample at a large university in the Memphis, Tennessee, area. The university's institutional review board approved study protocols. Permission was obtained, which included the requirement for securing informed consent from each participant.

Geographically, higher obesity rates and lower PA participation have been reported in the southern region states within the United States (Trust for America's Health, 2013). Results from the most recent CDC Behavioral Risk Factor Surveillance System show that the nationwide obesity rate is 27.8%, with the state of Tennessee (TN) having a slightly higher 29.2% rate and the metropolitan statistical area of Memphis, TN having an alarming 36.8% (CDC, 2011). In this study, the number of U.S. residents reporting no leisure-time exercise for the last 30 days was noted: U.S. = 26.2%, TN = 35.1%, Memphis = 37.7% (CDC, 2011). These numbers clearly illustrate a disproportionate issue with being physically active in TN and in the Memphis area.

Research Instruments

Motivational regulations. The Behavioural Regulation in Exercise Questionnaire-2 (BREQ-2) comprised the four subscales of Mullan, Markland, and Ingledew's (1997) BREQ assessing external

(four items, e.g., “I exercise because other people say I should”), introjected (four items, e.g., “I feel guilty when I don’t exercise”), identified (three items, e.g., “I value the benefits of exercise”), and intrinsic (four items, e.g., “I exercise because it’s fun”) regulations. In addition, four amotivation items from Mullan et al.’s initial item pool were included (“I don’t see why I should have to exercise,” “I can’t see why I should bother exercising,” “I don’t see the point in exercising,” and “I think that exercising is a waste of time”). Responses were scored on a 5-point Likert scale ranging from 0 = *not true for me* to 4 = *very true for me*. Previous studies have shown the scale to be valid and reliable to measure college students’ motivational regulations in exercise (Crăciun & Rus, 2012; Markland & Tobin, 2004; Vlachopoulos, Kaperoni, & Moustaka, 2011).

Physical activity. To assess the students’ self-report PA, the World Health Organization research protocol was used (King, Wold, Tudor-Smith, & Harel, 1996). The stem preceding the items was, “In the next question PA means all activities which raise your heart rate or momentarily get you out of breath, for example, doing exercise, playing with your friends, going to college, or PE. Sport also includes, for example, jogging, intensive walking, roller-skating, cycling, dancing, skating, skiing, soccer, basketball, and baseball.” Participants were also asked to indicate how often they engage in PA in a typical week on an 8-point response scale (0–7 days of the week). Previous research has shown the PA scale to have acceptable reliability and validity in adolescents (Booth, Okely, Chey, & Bauman, 2001).

Procedures

To recruit participants for the study, an e-mail was sent to randomly chosen instructors from popular undergraduate general education courses as well as undergraduate upper division courses across campus to ask permission to administer a hard copy of the survey within that class. Instructors of record from three classes responded; two courses were general education courses (introduction to psychology and college algebra) and the third class was an upper division exercise science section of an anatomy class. One research team member visited with the instructors to discuss the procedures for conducting the research and then scheduled the administration

and completion of the BREQ-2 and PA scale, which took approximately 10 min for students to complete. Once notified by the instructor, this research team member then revisited the instructors to collect the surveys. Overall, 130 surveys were given to students to complete and 113 were returned (86.9% return rate). Seventeen of these 113 surveys were not used because of issues of noncompliance with the research protocol (i.e., age not 18–24 years or incomplete survey).

Data Analysis

Data analysis was accomplished using the Statistical Package for the Social Sciences (SPSS version 12). Descriptive statistical results, specifically means and standard deviations, were first determined once the final data set was established. Also, Cronbach's alphas were calculated to check for internal consistency. To answer the first research question, that is gender differences, Pearson correlation coefficients and independent *t* tests were conducted. To answer the second research question, students were first divided into three PA categories based on their self-report PA: inactive group, students who were physically active 0–1 times per week; moderately active group, students who were physically active 2–3 times per week; and very active group, students who were physically active more than 4 times per week. This type of activity categorization has been used in large-scale PA studies (McDermott et al., 2007; Sheppard et al., 2011). Second, one-way analysis of variance (ANOVA) with least significant difference (LSD) tests were applied to examine differences based on gender and PA motivational regulation.

Results

Cronbach's alphas, Pearson's correlation coefficients, mean levels, and standard deviations of the variables applicable to answering the first research question are presented in Table 1. The internal consistency of the motivation variables were acceptable alphas ranging from .73 to .88 and .69 to .86, females and males, respectively. Finally, findings that help explore the second research question can be found in Table 2.

Table 1

Summary of Intercorrelations, Means, Standard Deviations, Cronbach's Alpha Coefficients, and the Results of the t Tests for All Variables

Variable	1	2	3	4	5	6	M	SD	α	t test	df	p
1 Intrinsic Motivation	–	.76**	.16	–.36**	–.40**	.52**	3.78	1.01	.88	3.40 ^a	94	.001
2 Identified Regulation	.88**	–	.50**	–.04	–.51**	.51**	3.80	.91	.83	.926	94	.335
3 Introjected Regulation	.31	.42*	–	.33**	–.11	.24	3.02	1.20	.83	–.222	94	.825
4 External Regulation	.01	–.58	.21	–	.17	.04	1.61	.65	.73	–1.091	94	.278
5 Amotivation	–.41*	–.58**	–.14	.12	–	.40**	1.13	.36	.85	1.259	94	.215
6 Physical Activity	.21**	.32	.34	–.27	–.30	–	2.66	1.89	n/a	1.66	59	.102
M	4.45	3.97	2.97	1.45	1.25	3.45						
SD	.68	.82	1.15	.69	.57	1.39						
α	.86	.77	.69	.84	.75	n/a						

Note. Intercorrelations for females ($n = 63$) are presented above the diagonal, and intercorrelations for males ($n = 33$) are presented below the diagonal. Means, standard deviations, and Cronbach's alphas for females are presented in vertical columns, and means, deviations, and Cronbach's alphas for males are presented in horizontal rows. The result of the independent t tests between females and males are presented in the column. Female's values are coded 0 and boys 1.

^aMales' values are statistically significantly higher compared with females'.

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

Table 2*Results of the Least Significance Difference Test*

Motivation regulation	(I) Weekly activity level	(J) Weekly activity level	Mean difference (I-J)	<i>p</i>
Intrinsic Motivation	Inactive	Moderately active	-1.09	< .001
	Inactive	Very active	-1.16	< .001
	Moderately active	Very active	-0.07	.821
Identified Regulation	Inactive	Moderately active	-0.75	.011
	Inactive	Very active	-1.00	.001
	Moderately active	Very active	0.25	.370

Note. Inactive ($n = 29$), moderately active ($n = 31$), and very active ($n = 36$).

Gender Differences

Intrinsic motivation was significantly and positively correlated with identified regulation ($r_{\text{female}} = .76$, $r_{\text{male}} = .86$) and weekly PA ($r_{\text{female}} = .52$, $r_{\text{male}} = .41$) and negatively correlated with amotivation ($r_{\text{female}} = -.40$, $r_{\text{male}} = -.41$) as well as with external regulation for females only ($r_{\text{female}} = -.33$). Identified regulation was correlated significantly and positively with introjected regulation ($r_{\text{female}} = .50$, $r_{\text{male}} = .42$) and PA ($r_{\text{female}} = .51$, $r_{\text{male}} = .32$) and negatively with amotivation ($r_{\text{female}} = -.51$, $r_{\text{male}} = -.58$). Females' introjected regulation was positively related with external regulation at a significant level ($r_{\text{female}} = .33$). A final significant correlation was a negative result linking amotivation and PA for both genders ($r_{\text{female}} = -.40$, $r_{\text{male}} = -.30$).

Mean level analyses showed that students had moderate to high levels of intrinsic motivation ($M_{\text{males}} = 3.45$, $M_{\text{females}} = 2.78$) and identified regulation ($M_{\text{males}} = 3.97$, $M_{\text{females}} = 3.80$), moderate levels of introjected regulation ($M_{\text{males}} = 2.97$, $M_{\text{females}} = 3.02$), and low levels of extrinsic regulation ($M_{\text{males}} = 1.45$, $M_{\text{females}} = 1.61$) and amotivation ($M_{\text{males}} = 1.25$, $M_{\text{females}} = 1.13$). Independent *t* tests showed that male students had higher levels of intrinsic motivation ($t = 3.40$, $p = .001$) compared with females. Although there were mean differences in weekly PA ($M_{\text{males}} = 3.45$, $M_{\text{females}} = 2.66$), the differences were not statistically significant ($t = 2.9$, $p = .09$; see Table 1).

Differences in Motivation Regulations

A one-way ANOVA was conducted to examine if students with different levels of weekly PA differed in their motivational regulations. To examine if this investigation possessed similar variances for motivational regulation, Levene's tests for homogeneity of variance were applied, with all showing nonsignificant test scores (all F values were between 0.127 and 0.882, p values .722 and .350), which indicates that this assumption was met. A significant effect was found of amount of PA on intrinsic motivation, $F(1, 94) = 9.45$, $p < .001$, and identified regulation, $F(1, 94) = 6.45$, $p = .003$, at the $p < .05$ level for the three conditions based on amount of activity within the past 7 days (inactive, 0–1 days; moderately active, 2–3 days; and very active, 4–7 days). In addition, a least significant difference post hoc test showed that the differences in intrinsic motivation occurred between inactive and moderately active groups ($p < .001$) and inactive and very active groups ($p < .001$) and in identified regulation between inactive and moderately active ($p = .011$) and very active ($p = .001$) groups (see Table 2).

Discussion

The overall purpose of the study was to investigate the relationships between college students' exercise motivation and weekly PA participation. The findings of the study partially support the previous findings (e.g., Currie et al., 2008) and our research hypotheses, pinpointing the gender differences in college students' exercise motivation. In addition, this study extends current literature by demonstrating how differently physically active college students are motivated toward PA. The findings of the study can be used to design motivating PA intervention to facilitate college students' PA and well-being.

The first aim of the study was to examine gender differences in college students' intrinsic and extrinsic motivation, identified and introjected regulation, along with amotivation and weekly PA participation. Participants had moderate to high levels of intrinsic motivation and identified regulation, moderate levels of introjected regulation, and low levels of extrinsic regulation and amotivation. The study partially supports our research hypothesis, revealing that male students have significantly higher levels of intrinsic motivation compared with females. These findings suggest that males are more engaged in PA because of internal factors, such as benefits received from exercise, stimulation, and enjoyment, compared with

females. However, the results from this study are inconsistent with prior research in which the researchers discovered that female college students, when compared with male counterparts, had lower levels of identified regulation and were more motivated to engage in exercise because of external factors (Egli et al., 2011; Gao & Xiang, 2008). Future studies are needed to investigate if this finding can be generalized across other college student populations in the United States. Surprisingly, the study findings did not support our research hypothesis or the findings of the previous studies in which males had higher PA levels compared with females (Currie et al., 2008; González-Cutre et al., 2011). This specific outcome concerning PA participation was possibly due to the small sample size rather than lack of gender differences. Future studies are needed to examine if these differences in intrinsic motivation contribute to PA participation.

The second aim of the study was to broaden what is known about how physically active college students differ in their exercise motivation. Statistically significant differences were found in intrinsic motivation and identified regulation. Post hoc test findings illustrated that these differences emerged between inactive (physically active 0–1 time per week) and moderately active (physically active 2–3 times per week) and between inactive and very active groups (physically active 4–7 times per week). These results support the hypothesis that physically active students are more intrinsically motivated toward exercise compared with inactive students and are in line with the tenets of SDT (Deci & Ryan, 1985), which suggest that self-determined motivation (intrinsic motivation and identified regulation) leads to volitional and long-lasting behavior across different contexts including exercise domain. These results reveal that not high levels of extrinsic motivation, but lower levels of self-determination are typical for inactive college students. Considering the busy life of college students, it may be that extrinsic exercise motives are not enough to alter negative PA behaviors, but more identified value of PA along with intrinsic pleasure are needed to engage in higher levels and amounts of PA. In addition, the differences in intrinsic motivation and identified regulation were between inactive and moderate active and inactive and very active groups and not between moderately active and very active groups. More research is needed to determine the best motivational structure to lead college students to participate in the daily recommended 60 min of moderate to vigorous PA. This information can be used to

create programs that lead individuals to be more physically active on a long-term basis.

Limitations

This study had limitations. First, students' PA was assessed with self-report measures using a one-item response, and therefore, the overall weekly PA levels may be biased. Although the validity and reliability of the World Health Organization's Health Behavior in School-Aged Children study has been shown to be acceptable when measuring PA among adolescents (Booth et al., 2001), adolescents have been found to overestimate the amount of time engaged in and the intensity of PA when self-reporting compared with using more objective measures, such as pedometers and accelerometers (Hussey, Bell, & Gormley, 2007). Second, there was a lack of causal relationships between gender, motivation regulation, and PA due to the nature of the correlational research. Researchers could implement causal relationships in future studies by comparing baseline and posttest results of an experimental and control group. Third, there was a sample size difference between genders. Although in many studies this difference can cause irregularities with the results, the Levene's test scores showed that the variances were similar enough for the findings to be accepted and to show that the homogeneity of variance assumption was met. Finally, the students emanated out of three courses; two were general education courses and one was an exercise science course. The exercise science students most likely were more intrinsically motivated to participate in PA than the other students, and this could have skewed the results.

Conclusions

This investigation of gender differences with motivational regulations for PA, gender differences with self-reported PA, and motivational regulations association with self-reported PA among traditional-aged college students (18–24 years) provides an in-depth analysis of factors associated with exercise motivation and weekly PA participation. These significant findings extend the current literature of the SDT model, specifically within the traditional college student population, on which research is not abundant. The impact of the study is twofold: (1) It provides more breadth to the SDT literature as we examined gender differences between PA and motivation regulation with traditional college students, and (2) the study is unique as we investigated how college students differ in their exer-

cise motivation based on their current participation in PA. With the information added to the breadth of existing knowledge, individuals have a more encompassing understanding of the relationships between gender, motivation regulation, and PA. The new evidence can be used to address current negative health conditions (e.g., obesity, type 2 diabetes) through comprehending the relationship between PA and motivation regulation for this age group. By understanding gender differences in motivation to be physically active and the relationships between motivation regulations and PA, health and exercise professionals can apply the findings and create programs that will lead individuals to be more intrinsically motivated to exercise. Research without application will not change negative health indices, but accurate application of research to create health and exercise programs is an effective strategy. Though many barriers hinder individuals from engaging in proper levels and amounts of PA, research is available to help arm health and exercise professionals to affect the overall well-being of society positively.

Practical Implications

The results from this study advocate for school-based health and physical education programs that engage students physically and promote internal motivation. With rising costs for treating sedentary-related conditions, such as obesity and diabetes (Finkelstein, Trogon, Cohen, & Dietz, 2009), it becomes important for measures to be taken to address unhealthy practices. Quality physical education programs should begin in early childhood and continue throughout the school years. An abundance of opportunities should also be available for PA to be encouraged throughout the school day and within the community. A physically inactive population will only continue to further establish sedentary lifestyles that Americans have developed. Through the investment of quality health and physical education programming, students can learn the importance of PA and develop an intrinsic motivation to be physically active. Within this focus on PA during the school years, youth will be able to find and adopt an activity or sport that fulfills their needs, which may lead to a more self-determined approach toward engaging in PA for life.

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PHYSICAL EDUCATION

Increasing Physical Activity During the School Day Through Physical Activity Classes: Implications for Physical Educators

Megan Adkins, Matt Bice, Todd Bartee, Kate Heelan

Abstract

Across the nation schools are adopting health and wellness policies, specifically physical activity (PA) initiatives that aid healthy long-term lifestyles. Interest has been generated about the inclusion of physical activity classes to complement existing physical education classes. Furthermore, discussion has evolved as to if additional instructional resources are needed for physical educators to be adequately equipped to instruct physical activity classes. In this study, we evaluated the instruction and classroom management of physical education teachers instructing a physical activity class over 10 weeks. The purpose of this study was to identify specific instructional constructs that limit movement time. Implementation barriers were identified and used to create techniques to enhance professional education practice and transition a physical education teacher successfully into instructing a physical activity class. With the development of the program Mission Possible: Physical Activity Every Day and the new Physical Activity Leader (PAL) initiative developed by SHAPE America (formally known as AAHPERD) through a partnership with Let's Move! Active Schools, strategies

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provided in this article will help children obtain the goal of reaching 60 min of physical activity a day.

In the United States, a challenge exists of how to engage children in a day of moderate to vigorous physical activity (MVPA) when individual, interpersonal, environmental, and demographic factors are affecting the opportunity and amount of time children are able to be involved in physical activities (Centers for Disease Control and Prevention [CDC], 2011). Children can receive a variety of benefits by being physically active throughout their lives. Children can gain muscle and improve bone strength as well as have a decreased risk of developing type 2 diabetes or even high blood pressure (CDC, 2011). Continued involvement in physical activity (PA) of children has been shown to improve academic success and enhance psychological health (Active Living Research, 2007; Basch, 2010; Hillman et al., 2009; Trudeau & Shephard, 2008; Sulemana, Smolensky, & Lai, 2006; U.S. Department of Health and Human Services [USDHHS], 2010a, 2010b).

School settings have been identified as an evidence-based opportunity to increase PA among school children (USDHHS, 2010a, 2010b). The CDC and the Society of Health and Physical Educators (SHAPE America) have collaborated to develop the Comprehensive School Physical Activity Program (CSPAP), which provides school-based PA opportunities to help improve the overall health and wellness within the constraints of the school environment (CDC, 2011; National Association for Sport and Physical Education, 2008).

The CSPAP was developed to help meet the national recommendation of 60 min of MVPA every day (Physical Activity Guidelines for Americans Midcourse Report Subcommittee of the President's Council on Fitness, Sports, and Nutrition, 2012). The CSPAP model includes (a) high-quality physical education (PE), (b) PA opportunities during school, (c) PA before and after school, (d) staff involvement, and (e) family and community engagement. This multicomponent approach is needed because PE weekly requirements are decreasing and it is necessary for the SHAPE America (2014) standards to be the focus of curriculum time. "The goal of a quality PE class is to develop physically literate individuals who have the knowledge, skills and confidence to enjoy a lifetime of healthful physical activity" (SHAPE America, 2014, p. 11). Furthermore, there are specific grade outcomes and objectives geared to help students' cognitive, affective, and psychomotor development.

Time spent in MVPA often decreases in PE to obtain the goals and standards required, and other opportunities to obtain MVPA should be discovered.

The primary purpose of this study was to determine if an alternative PA opportunity for schools, provided during the school day, could be implemented in a structured PA class. The secondary purpose was to evaluate the percentage of time spent in movement during PA class taught by qualified PE teachers.

Method

Sample and Participant Selection

Schools. Three low socioeconomic Title I elementary schools, defined as having a school population with a poverty level (determined by free and reduced-price meal counts) at or above 40% (U.S. Department of Education, 2013), were selected as implementation sites for the Mission Possible: Physical Activity Every Day program. Selection of the schools was a result of past research findings completed by the research staff that showed evidence of low-income families having higher obesity rates with less active children. This concurs with research completed by Ogden, Lamb, Carroll, and Flegal (2010). School administrators and teachers strategically allocated time from their existing curriculum to create a 20- to 25-min PA class on days PE was not offered. PA time allotments were a product of teachers identifying areas within the curriculum for which minutes could be reassigned. Schools developed individual PA schedules to emulate the PE schedule to maintain a routine for students. PA class time ranged from 20 to 25 min depending on grade level and curriculum flexibility and did not diminish time in recess or other extracurricular activities (art, music, etc.).

PA instructors. Three individuals were hired to instruct PA classes. Hired instructors were concluding their collegiate coursework and formally trained to be PE teachers but had never been professionally employed. Each teacher had experience teaching PE (as a student teacher) but had never instructed a PA class. PA instructors were assigned to one elementary school to teach multiple PA classes 2 days per week over the first half of the school year.

Difference between PE and PA. The purposes and objectives between PE and PA classes are distinctively different. The two terms, *physical education* and *physical activity*, are used similarly but constitute different meanings. PA, defined as “any bodily move-

ment produced by skeletal muscles that results in energy expenditure” (Caspersen, Powell, & Christenson, 1985, p. 126), developed into a curriculum class has a primary objective of students moving with limited instruction. One goal during PA class is to keep the activity at an MVPA level for a significant portion of the class time. A quality PE program should include the MVPA format least 50% of class time along with other psychomotor, cognitive, and affective development activities (USDHHS, 2010a, 2010b). The purpose of PE classes is to provide instruction and practice of skills for activities and movements in relation to the SHAPE America (2014) standards and grade outcomes, not just focus on MVPA.

Training. Prior to teaching PA classes, PA instructors were given information about the PE curriculum, data collection procedures, and the expectations of teaching PA. The main expectation for the PA instructors was to implement activities related to the PE curriculum the students were learning each week. Activities allowed additional movement time, reinforcing PE concepts. No additional training was provided as we assumed that the PA instructors were adequately prepared from the physical education teacher education (PETE) program they had completed.

After direct observations during Week 1, we determined additional training was needed because the delivery of instruction resembled a PE class rather than a PA class structure. The PA classes at all three sites, for the first week, included a warm-up, introduction, skill instruction, progress to develop the skill taught, enrichment activity, and closure. Movement time was less than 50% of class time; therefore, modifications and additional instruction were needed to engage the students successfully (see Figure 1).

We met with the PA instructors and school PE teachers for a detailed training session. Training was focused on distinguishing the difference between PE and PA and consisted of determining the amount of time dedicated to skill development, instruction, and PA. Additional training was concentrated on ensuring PE and PA curriculums linked concerning skills and activities to reinforced instructional concepts, but no new skill development was taught. Training strengthened the understanding and purpose of PA class and curriculum routine. We provided the PA instructors guided assistance on how to design PA class curriculum based on a class outline (see Table 1). Last, we gave PA instructors instructional autonomy and encourage them to use curriculum development skills acquired from PE training.

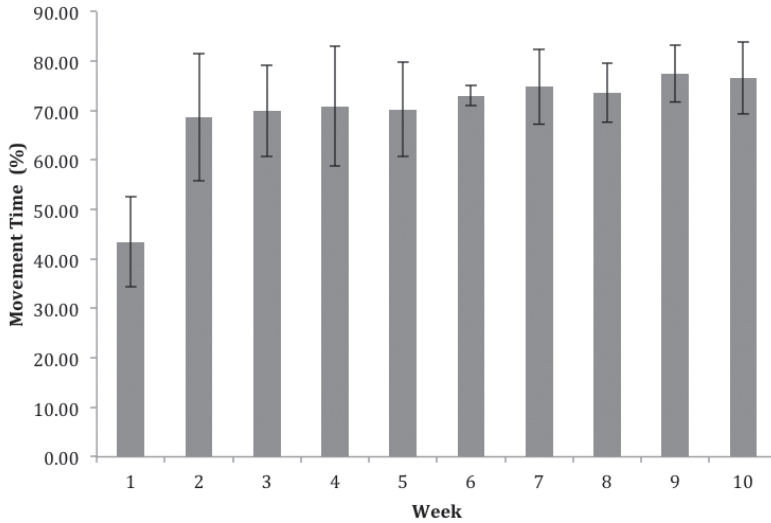


Figure 1. Summary of movement time means of physical activity class implementation. This graph represents weekly means and standard deviations over 10 weeks.

Table 1
Physical Activity Class Online

Time	Step
30 s	Students enter into the gym and begin walking around the “out-side track.”
4 min	Early Bird/Instant Activity: Students arrive at the class and quickly read about the activity they are going to perform, or teachers may meet them at the door and explain what they are to do. Upon completion of the activity, the heart rate of the students should be elevated.
30 s	Transition time to the middle of the circle: Students movement from one activity to the next.
1 min 30 s	Explanation of the activity for the game: Rules, etc. are stated.
30 s	Transition to set up the game/activity.
XX min	Activity.
1 min	Closure/Transition: Students exit the classroom (students circle up and walk the circle and the teacher selects one individual as the line leader).

Data Collection

Movement time. Data assessing total student movement time were collected and were represented as a percentage of the total class time. Movement time was quantified using a stopwatch and manual timing when students were active and established when the entire class was moving. During instruction, transition time, or addressing behavioral issues, movement time recording was stopped. Three individuals from the research team collected movement time data. Interrater reliability tests were performed to ensure stopwatch management reliability. Interrater reliability was significant, $r(22) = 0.985, p < .001$.

PA instructor checklist. After Week 1, we developed a checklist for the PA instructors to complete at the conclusion of each class. Instructors completed a self-report checklist on which they identified what they liked most about the lesson, liked least about the lesson, and what they would change for future implementation. PA instructors reported barriers that limit PA instruction, games that worked well, and aspects of PA class that could be changed to help make PA class more active. Because instruction and lesson/activity themes were different among grade levels, we asked instructors each question twice concerning kindergarten to second grade and third to fifth grade. Last, we asked PA instructors to record how students received the activity of the day. We coded themes and used them to establish techniques and strategies to help deliver instruction more efficiently. We used combinations of quantitative and qualitative data to create strategies that can be used to help PE teachers successfully teach PA classes with high amounts of PA levels from the children the majority of the class time.

Results

Transition time and classroom management were identified through the PA checklist and movement time data as being the two areas of most concern during Week 1. Before Week 2 began, we met with the PA instructors met to address transition time and classroom management. As a result, movement time increased from Week 1 (43.42%) to Week 2 (68.62%) by 25.2%. Movement time steadily increased over the following weeks, resulting in 6 additional movement minutes in PA class (see Table 1).

Thematic categories, identified in PA instructor checklists, revealed instructors believed PA lessons were easy to implement once modifications were made from observational feedback and main-

tained student attentiveness. PA instructors noted that “kids were engaged” and “constantly moving.” On the other hand, PA instructors also concluded that they had a difficult time explaining activity rules in a quick time frame and identified that the amount of space required for PA class played a vital role for successful implementation. Last, PA instructors concluded that rules of activities were different between PE and PA classes. Explanation needs to be quick and efficient with simple variations of a single game rather than a progression of skill development.

Discussion

In this study, we identified an alternative way for schools to deliver PA to students during the school day by allocating 20 to 25 min for a PA class on days PE was not offered. All three schools integrated the additional PA class without eliminating existing PA opportunities, such as recess. Principals and teachers believed the project would benefit students enough to warrant additional time and restructured schedule. Teachers gave 1 or 2 min from core classes to create the PA time slot. Minutes transferred from core classes provided classroom teachers additional time to work on their daily core curriculum lessons and activities. Time management, a PA outline, teaching techniques, behavior management, and the relationship between PE and PA were vital aspects to integrate a PA class successfully and to help prepare PE teachers to instruct PA classes.

Time Management

Differentiating PA curriculums from PE curriculums, although the same skill themes were used, is important for class planning. PA instructors noted that PA classes were simple to plan and implement. However, PE teachers used transition times to regroup and organize classes. Transition time in PA class should be quick switches, allowing students to be movement free for minimal time. We calculated and observed that PA instructors spent significantly more time during transitions between activities, spent excessive time explaining activities, and were not efficient at closing the lesson decreasing movement time during Week 1 prior to the training. With additional training and consistent messaging, transition time decreased from over 2 min during Week 1 to less than 30 s in Week 10. Decreased transition maximized class time by allowing for more movement time.

PA Outline

PA instructors were provided a general outline during the preimplementation training. After Week 1, we identified the need to provide a more specific outline of how much time PA instructors should spend on lesson components including instant activity, transitions, instructions for the activity, and closure to maximize class time (see Figure 1). Tactics to help PA instructors modify their curriculum were discussed in weekly meetings face-to-face or via electronic mail conversations during the first three weeks of implementation. In addition, PA instructors were provided access to SPARK, for curricular ideas for class activities. The PA class outline proved to be a valuable source that instructors used to maximize movement time and organize PA class.

Teaching Techniques

Mosston's Spectrum of Teaching Styles for teaching PE has been taught and implemented in many PE curriculums to help meet the diverse needs of students and the SHAPE America (2014) standards and outcomes outlined for each grade level (Mosston & Ashworth, 2002). The Spectrum has no single superior teaching style (Goldberger, Ashworth, & Byra, 2012; Mosston & Ashworth, 2002). The use and significance of each style is expended to relate to the teaching objectives, in this case high MVPA levels. The command teaching style was used in the PA classes to engage students quickly in an MVPA level. Command style, defined as teacher-directed teaching, has been shown to increase movement time and level of student involvement in PA (Mosston, 1992; Sanchez, Byra, & Wallhead, 2012). Command style is a style of teaching in which the teacher establishes most of the decision making on what to do, how to do it, and the level of achievement expected (Mosston & Ashworth, 2002; Nichols, 1994; Sanchez et al., 2012). For example, in a jumping lesson on jump roping, in PE, a teacher would demonstrate and describe the correct technique to hold the rope and complete the forward jump rope skill, and after the demonstration, the students would begin practicing by mimicking what was taught to be more successful in the action demonstrated. In PA class, the students would be told to complete the jump roping activity taught in PE and explain the expected level of achievement or activity correlated with the skills taught.

PE and PA

CSPAP and Let's Move! Active Schools recommend PE and PA. Administrators and school district officials need to understand how PE and PA relate to each other, how they can be equally addressed in a time-constricted environment, but cannot be used synonymously.

As stated prior, the definition of PA is different than that of PE. When PA instructors develop PA classes, the primary objective of students is to be physically active with limited instruction by the teacher. Educational preparation for a certified PE teacher encompasses PA promotion by having the goal of developing "physically literate individuals who have the knowledge, skills and confidence to enjoy a lifetime of healthful physical activity" (SHAPE America, 2014, p. 11). Furthermore, there are specific grade outcomes and objectives geared to help students' cognitive, affective, and psychomotor development. With these attributes, PE teachers are qualified to help develop PA opportunities, but the curriculum structures between PE and PA classes vary significantly.

Understanding that instructional differences exist between PE and PA and findings from this study led us to conclude there are necessary steps required to enhance instruction. We recognized in the early stages of this study that simply providing another PE day did not meet the goal for PA movement time, thus why we added PA classes geared toward MVPA only to the school curriculum.

Although PE and PA classes are different, some collaboration between PE and PA are necessary to leverage instruction and skill development time in PE class, leading to a greater effect on the students and the school. Incentives implemented in PE class should be spread across PA classes. Individual and class incentives could serve as a means to engage and reinforce PA concepts. For instance, a positive class behavior chart could be developed in PE and PA to reward students with a favorite PA after a certain amount marks are met. Skill development taught in PE can continue to occur indirectly through the games played in PA class as well. We found that many PE-trained teachers need additional educational interventions and trainings, but with proper training, a PE teacher can successfully instruct a PA class.

Limitations

Coordination of activities and communication between the PE teacher and the PA instructor was an issue and could conceivably be a problem for future teachers using the model developed. Experi-

ence and educational backgrounds convey unique qualities that are beneficial and different among PA instructors. Instructor uniqueness results in different teaching capacity, yielding varying and potentially additional training. We evaluated movement time, not MVPA. A next step for the Mission Possible: Physical Activity Every Day program is to evaluate the intensity level of PA during PA classes.

Conclusion

As PE time has decreased in schools, the need for daily PA for children has increased. Schools are a key setting to increase PA among children. Administrators are working to identify alternatives within the school day when PA can be disseminated. The implementation of a PA class provides a viable strategy for administrators to consider to help meet the recommended 60 min of MVPA a day for children and help improve time on task, behavior, and academic scores in the regular classroom (Active Living Research, 2007; Basch, 2010; USDHHS, 2010a, 2010b). The mission to increase PA of children can be made possible with the creativity of the principal to modify the school schedule and with the help of the PE teacher. Additional resources and training may be needed to implement this type of program successfully into a school depending on the capabilities of the teacher to understand the difference between PE and PA teaching.

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RECREATION

Summer Camp and Positive Youth Development: Program With Romanian Youth

Jennifer S. Feenstra

Abstract

A variety of activities are used in camps to help promote positive youth development, improving social skills and self-esteem in campers. I expanded on previous camp research in this study to address the influence camps have on trust, belief in the honesty of others, empowerment, and care for others in youth in Eastern Europe. Since 1999, New Horizons Foundation has been conducting a summer camp with a focus on experiential education with Romanian youth to encourage positive development in youth and help them contribute to their communities. I evaluated change in self-reported trust, belief in the honesty of others, empowerment, and care for those less fortunate of 490 campers ($M_{age} = 14.8$ years, 52.8% female). Participants showed an increase in reported trust in others, belief in the honesty of others, and empowerment. No increase was found in caring for others. Individuals who work with youth as well as those who support camps should be encouraged by these findings as they indicate that camp has even more positive effects on a wider population of youth than previously studied.

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Every summer, around the world, youth spend time in summer camps. Camps are focused on developing skills in sports or music, encouraging interest in topics such as science and technology, or promoting a particular faith tradition (Jones, 2005; Schnitker, Felke, Barrett, & Emmons, 2014; Williams, Ma, & Prejean, 2007/2008). Other camps work with specific populations of youth, such as those with particular health or ability challenges, to provide support and challenge within their level of ability (Gillard & Watts, 2013; Gillard, Witt, & Watts, 2011; Walker, Barry, & Bader, 2010). No matter their focus, almost all camps use activities that expose campers to new, interesting, and challenging experiences within the context of supportive relationships to promote positive growth (American Camp Association, 2006; Garst, Browne, & Bialeschki, 2011).

Youth develop a variety of positive qualities at camp (Bialeschki, Henderson, & James, 2007). Shirilla (2009) found that some campers involved in an adventure education–based camp experience showed better interpersonal skills. Campers may experience positive self-concept change (Hazelworth & Wilson, 1990). At-risk youth involved in a 6-week day camp involving dance as a tool for positive development showed an increase in hopeful thinking (Kirschman, Roberts, Shadlow, & Pelley, 2010). These findings, and those in other studies, were supported and expanded by a large-scale study involving over 3,000 campers at a variety of camps (Thurber, Scanlin, Scheuler, & Henderson, 2007). From precamp to a 6-month follow-up, campers grew in social abilities such as friendship skills and comfort in social situations. Camper self-esteem and independence increased over the precamp to 6-month follow-up period. Camp involvement was also related to greater spirituality. Although not evident in comparing camper’s ratings from before to after camp, camper’s expressed a greater willingness to explore and engage in adventure as well as expressed more positive values in the 6-month follow-up period compared with the immediate postcamp assessment. Many of these results showed up not only in the campers’ reports but also in assessments provided by parents and camp staff.

By studying camps of different length, style, and affiliation, Thurber et al. (2007) made it clear that camps of a variety of iterations have an important effect on youth. This and other studies, however, have been conducted primarily in the United States, Canada, and Western Europe. Work within other cultural contexts is needed to better understand the effect of camp on youth around the world. Based on the issues faced by the country or cultural group outcomes

beyond that shown by Thurber et al. (2007) may be important to address. For example, war and conflict between ethnic groups have affected youth in countries around the world. Although these topics are likely to be of lesser concern in a camp for American youth, an important emphasis for an Israeli camp may be attitudes toward those of different ethnic groups (Amier & Garti, 1977), whereas a camp in Bosnia may be focused on peace and friendship (Darvin, 2009).

Communism in Central and Eastern Europe left scars on the psyche of the people in these countries (Gallagher, 2005; Howard, 2002; Pippidi, 2002). A summer camp program developed in Romania was set up to address the mistrust and apathy resulting from decades of rule by a repressive government (Gallagher, 2005). New Horizons Foundation began its experiential education–based summer camp program with the youth of Romania in 1999, naming the program *Viața*, the Romanian word for life. High and low ropes, rock climbing, hiking, orienteering, ecological projects, and service-learning projects are used in the weeklong camp to encourage positive outcomes. Debriefing occurs after each activity or element. Arts and crafts, workshops, and artistic activities can also be part of the program. Given the cultural context, the program is focused on changing the mind-set of youth toward others and creating a belief in their ability to make positive changes in their environment. Specifically, goals of the program are to increase trust in others, beliefs about the honesty of others, empowerment, and care for the less fortunate.

Trust and Belief in the Honesty of Others

Many scholars have written about the importance of trust in society and relationships (Fukuyama, 2000; Rose-Ackerman, 2001; Uslaner, 2004). Individuals who trust also tend to be those who participate in civic activities (Brehm & Rahn, 1997; Uslaner & Brown, 2003). Lack of trust stifles human and economic development and damages democracy (Dearmon & Grier, 2011; Inglehart, 1999; Özcan & Bjørnskov, 2011; Uslaner, 2004). Trust also affects relationships; with lower trust, individuals engage in activities that harm relationships and create greater relationship instability (Campbell, Simpson, Boldry, & Rubin, 2010; Uysal, Lin, & Bush, 2012).

A belief that others are honest is also important to personal relationships and society as a whole (Pinotti, 2012; Weber & Ruch, 2012; Zsolnai, 2004). Individuals who are perceived as honest are

better liked and seen as more attractive (Paunonen, 2006). Honesty and trustworthiness are strongly desired characteristics of romantic partners (Regan, Levin, Sprecher, Christopher, & Gate, 2000). Belief in the honesty of others also has an effect on the individual's honesty. When people believe others are honest, they behave in more honest ways themselves, and when they believe others are dishonest, they behave dishonestly (Innes & Mitra, 2013).

Change in an individual's level of trust and belief in the honesty of others may occur with changes in circumstances or new learning. Trust is still developing during adolescence, so camp may be an ideal place for the development of greater trust in youth (Flanagan & Stout, 2010; van den Bos, Westenber, van Dijk, & Crone, 2010). Camp, as well as other 4-H activities, has been shown to increase trust and respect in youth participants (Kinsey, 2013). In Dworken's (2001) study, parents reported that after camp their children were better able to open up and share with others, an act that requires a belief in the honesty and trustworthiness of others. Overall, trust and belief in the honesty of others is important, and camp may be a place for youth to develop those qualities.

Empowerment and Care for Others

Although youth may trust and believe in the honesty of others in their environment, unless they believe their actions can make a difference, it is unlikely they will act upon those positive feelings toward others. Researchers have found that the experiences of youth can encourage them to act in prosocial ways (Cargo, Grams, Ottoson, Ward, & Green, 2003), though research on camps in this realm is sparse. Research on the development of empowerment and caring in youth has been focused on experiential education rather than camp. Experiential education, with its focus on direct experience accompanied by focused reflection, is often part of camp experiences (American Camp Association, 2006; Association for Experiential Education, 2014).

Experiential education can help individuals feel more empowered to act. Carver (1996) described this piece of the participant experience as agency. Students involved in nonformal education, such as that experienced at camp, learn that they can be agents of change in their own lives and communities. The personal empowerment developed through experiential education has been shown to make a difference in life effectiveness, which includes qualities such as active engagement and achievement motivation (Sibthorp & Arthur-

Banning, 2004), and in hope (Kirschman et al., 2010). In a meta-analytic study, Hattie, Marsh, Neill, and Richards (1997) found that experiential education increased participants' sense that their actions would make a difference in a situation. Gillis and Speelman (2008) reported a similar effect on participants in their meta-analysis of ropes course experiences.

Camp experiences take youth outside of their everyday experiences and put them in a situation in which caring for others is often necessary (Thurber et al., 2007). For example, in many team sports played at camp or in a ropes course element, an individual's success or ability to continue is directly related to a teammate's success. Weaker members must be helped and encouraged for the whole group to succeed. Such activities can, therefore, develop participants' caring for others (Goldenberg, McAvoy, & Klenosky, 2005; Hattie et al., 1997; Prouty, 2001). Although individuals may feel more caring toward their fellow members, can such experiences translate into a caring for others beyond the group? Some theorists have suggested that bonding within a group can promote bridging beyond the group (Brehm & Rahn, 1997; Larsen et al., 2004; Warren, Thompson, & Saegert, 2001). Experiences at camp that include helping or supporting others, therefore, may translate into greater care for those in the participants' home community who are less fortunate.

Given previous work on the effects of camp and experiential education on youth, in the present study, Romanian youth involved in a weeklong summer camp were expected to show positive growth in a number of areas. Camper reports of trust in others were expected to change, indicating more trust in others after camp. Campers were expected to increase in their belief in the honesty of others. Sense of empowerment was expected to grow over the weeklong camp experience. Finally, feelings of solidarity with the less fortunate were expected to increase.

Method

Participants and Procedure

I analyzed archival data collected from youth involved in New Horizons Foundation Viața program in 2005, 2006, and 2007. Participants were surveyed during their first day at camp and again at the end of the weeklong program. The camp program involved team-building activities such trust falls, low-ropes and high-ropes

elements, and rock climbing. Reflection and discussion followed each activity. Some campers learned orienteering and did arts and crafts or artistic activities. Evening activities included workshops and storytelling. A service-learning project was often done toward the end of each week, time and weather permitting.

There were 733 cases from the 3 years of data collection, with 528 providing data that could be matched before and after data. The unmatched data were pre- or posttest cases missing an identifying number in the corresponding pre- or posttest case. About the same percentage of cases each year were unmatchable: 24.1% (58 of the 241 cases) in 2005, 28.0% (69 of the 246 cases) in 2006, and 28.2% (51 of the 181 cases) in 2007. Occasionally, Viața leaders or others filled out the survey as well as the campers. Because youth were the primary focus of this research, participants over age 19 were excluded from the analyses, leaving 490 matched cases.

Average age of participants was 14.8 years ($SD = 0.29$), with a range from 7 to 19. Roughly half were female (52.8%), with 2.6% of respondents not indicating gender. As would be expected from demographics of the population of Romania, 79.6% of the campers reported their religion as Orthodox. The rest were Protestant/Neoprotestant (9.2%), Roman Catholic (4.3%), some other religion or no religion (6.6%). Most of the students came from homes with parents who were married (74.7%), with smaller percentages from homes with parents who were divorced (14.7%) or of some other marital status. Most of the campers lived with a parent (80.7%) and had a sibling (76.7%).

The questionnaire participants filled out demographic questions including age, gender, religion, and family status. The same questions about trust, honesty, empowerment, and care for others were asked at the pre- and posttest. Questions were asked in Romanian, so the wording of the questions described here is a translation from Romanian.

Trust was assessed with two items. The first was the question used to assess trust with the World Values Survey (www.worldvaluessurvey.org) and is sometimes referred to as the “standard” trust question (Uslaner, 2012). The question reads, “Generally speaking, do you believe that most people can be trusted or you can’t be too careful in dealing with people?” Campers were asked to choose one of the two beliefs. They were also asked to rate, based on what best characterized them, their level of trust on a scale from 0 = *you cannot trust people at all* to 10 = *you can trust other people a lot*.

Assessment of belief in the honesty of others was done with the question, “Do you agree or not: Most people in my town are honest people?” Campers answered on a 1 = *very much* to 4 = *very little* scale. To investigate feelings of empowerment campers were asked, “How much can people like you and your family do to make your city or community better?” They responded on a 1 = *very much* to 4 = *very little or nothing* scale. Finally, care for others was assessed with the question, “How important do you think it is to be in solidarity with people who have worse lives than you?” Participants answered on a 1 = *not very important* to 5 = *very important* scale.

Results

Participants were asked to indicate their general trust in others with two questions. In answering to the first trust question, 237 participants responded *others can be trusted* before and after their week of Viața camp. Only 15 participants responded *others can be trusted* when asked before camp and *you can't be too trustful* after camp. Of those responding *you can't be too trustful* before camp, 107 answered *others can be trusted* after Viața camp and 47 answered *you can't be too trustful*. In terms of change, with this question the majority of participants (70%) did not change their response. Only a small percentage (3.7%) moved from believing others could be trusted to reporting a distrust of others. Most of those who changed their response moved from believing others could not be trusted to reporting a trust in others (26.4%).

In the second trust question, participants were asked to put themselves on a scale from 0 = *you cannot trust people at all* to 10 = *you can trust other people a lot*. A statistically significant change was found, $t(481) = 10.41$, $p < .001$, Cohen's $d = .50$, with higher scores after Viața ($M = 8.01$, $SD = 1.85$) than before ($M = 6.99$, $SD = 2.22$). These results indicate participants were more trusting after their Viața experience than they were before. With medium effect size, this is a difference that should be readily observable (Cohen, 1992).

As with trust, belief in the honesty of others also increased significantly during Viața. Responses to the question, “Do you agree or not: Most people in my town are honest people?” became more favorable. The mean response to the question before Viața was 2.80 ($SD = 1.06$), which decreased to 2.46 ($SD = 0.96$) after Viața, indicating an increase in a belief in the honesty of others. This was a statistically significant change, $t(481) = 6.48$, $p < .001$, Cohen's $d = .34$.

To assess empowerment, Viața participants were asked, “How much can people like you and your family do to make your city or community better?” After Viața, the campers felt like they could do more ($M = 1.69$, $SD = 0.73$) than they had when they first came ($M = 2.03$, $SD = 0.83$), $t(484) = -8.49$, $p < .001$, Cohen’s $d = .44$.

In response to the question, “How important do you think it is to be in solidarity with people who have worse lives than you?” there was a small increase in ratings over the week of Viața. This small increase was not statistically significant, $t(472) = -1.80$, $p = .073$, Cohen’s $d = .089$. At the beginning of Viața, the mean response was 3.88 ($SD = 1.12$). It increased only slightly to 3.98 ($SD = 1.13$) at the end of the week.

Discussion

Summer camps have long served youth. Camp attendance has been shown to have a positive effect on campers (Thurber et al., 2007). In the present study, a camp population different from that studied in most research was investigated. The summer camp for Romanian youth investigated in this study showed an increase in self-reports of trust after their time at camp as well as an increase in a belief in the honesty of others. Trust and a belief in the honesty of others are important for social relationships (LaFollette & Graham, 1986; Sagarin, Rhoads, & Cialdini, 1998), so some rise is desirable and may facilitate connections with peers and adults for these youth.

The youth who participated in the weeklong experiential education camp were more likely to believe they and their family could improve their community. This finding is in line with what Gillis and Speelman (2008) and Hattie et al. (1997) found for the effect of participation in experiential education and belief in a person’s ability to engage in activities that will have an effect. These findings suggest that camp promotes qualities in youth that help them believe they can make a difference. Theories such as the theory of reasoned action link such beliefs in a person’s ability to engage in the behavior (Warburton & Terry, 2000).

Given the nature of camp, experiential education more generally, and the findings of previous research (e.g., Quay, Dickinson, & Nettleton, 2002/2003), a change in the care participants felt for those less fortunate was expected. The change found in the present study, however, was not statistically significant. Caring within the group might have changed; however, moving from bonding within the group to bridging beyond the group may need more time or effort.

The findings of this study should be interpreted with caution. Youth participating in Viața may not fully represent the average Romanian youth. Because this was a voluntary program, only youth interested in this type of experience were likely to sign up and participate. These youth might have been uniquely prepared to make gains in the variables studied. The study also occurred over a short time. The second assessment was done at the end of the week of Viața. Although Thurber et al. (2007) found that gains from camp were maintained for a year after camp, later follow-up might show different results with the variables assessed in the present study. The assessment instruments themselves were also short. The variables were assessed with one or two questions. Some concern exists for reliability of such assessments (i.e., Nannestad, 2008). The first trust question, however, has been used for years in the World Values Survey and others surveys (Delhey, Newton, & Welzel, 2011; Uslaner, 2012).

Although further research is needed, the results of this study are encouraging. Sizeable changes occurred in the self-reported trust and empowerment of youth along with a smaller, although still statistically significant change, in belief in the honest of others. Within the context of Romania, these are particularly important variables. After years of rule under a communist dictator, followed by years of fragile and corrupt democracy, citizens learned to be suspicious of others and generally avoided contributing to development of the larger community (Coșpănar, Lonean, Mitică, Ionescu, & Drăjneanu, 2012; Gallagher, 2005). Summer camp directors and staff, physical education instructors, and parents and teachers may be encouraged to know that youth not only develop personally important qualities through experiential education such as self-esteem but also qualities such as trust and empowerment that will help their communities thrive.

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SPORT

The Effects of Motivational Climate on Youth Sport Participants

Alison Prichard and Joe Deutsch

Abstract

Sports are popular across the nation and youth sport participation is at an all-time high, yet children are quitting youth sports at an alarming rate. If this trend is going to change, several areas of concern must be addressed. The climate created on youth teams can be polarizing, having the potential for significant positive or negative developmental effects. Therefore, the authors explore achievement goals, motivational climate and personal development, and TARGET descriptions. They offer suggestions for coaches, such as creating a mastery climate or fostering a more positive environment, so this negative trend can hopefully be curbed. Creating a mastery climate presents an environment in which children feels competent and successful and could be the key important factor in their continued participation in youth sport.

There is little doubt that the world is infatuated by sports. People watch them, analyze them, argue about them, spend money on them, and encourage their children to play them. Not surprisingly, youth sport is the most popular structured activity in the United States, with an estimated 45 million American children enrolled in an organized program or team in 2005 (Mahoney, Larson, Eccles, & Lord, 2005). Attention has been devoted to maximizing this access and determining effective ways to use the popularity as a tool in youth

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development. Researchers Côté and Fraser-Thomas (2007) identified three major developmental goals that should ideally be accomplished through youth sport. First, sports can contribute to a child's physical health and development by providing youth with opportunities to be active. Second, youth sport can facilitate appropriate psychosocial development as children learn important life skills such as teamwork, discipline, leadership, sportsmanship, and self-control. Third, children learn motor skills that build a foundation for successful lifetime participation in athletics, from future professional athletes to recreational weekend warriors.

Few people would disagree that sport participation offers significant opportunities for health betterment. The potential physical benefits of exercise are numerous and have been well researched. Weight control, cardiovascular health, muscle and bone development, and flexibility are just a few of the important physical developments associated with youth participation in sports (Wankel & Berger, 1990). In addition, habits associated with physical activity in youth have been linked to exercise habits in adulthood (Robertson-Wilson, Baker, Derbyshire, & Côté, 2003), so developing these positive tendencies toward sport and physical activity in childhood is critical for continued involvement. Physically active adults are significantly less likely to develop diseases such as obesity, diabetes, depression, cancer, heart disease, and osteoporosis (Berger & Owen, 1988). Also, participation in youth sport has been associated with the development of key character elements such as citizenship, leadership skills, positive peer relationships, and teamwork (Côté & Hay, 2002). Individuals who participated in organized athletics growing up were also more likely to attend college and experience career success (Eccles & Barber, 1999).

The potential for positive outcomes relating to youth sport participation undeniably exists, but involvement does not guarantee these effects will automatically occur. Despite youth sport participation being at an all-time high, so too is the frequency of childhood obesity (Tremblay, Katzmarzyk, & Willms, 2002). Furthermore, although the potential for positive psychosocial developments exists, some youth sport participants report negative cognitions related to their involvement. These feelings include lack of enjoyment, decreased self-confidence, and high levels of performance anxiety. The most common offenders responsible for these adverse changes include feeling excessive pressure to win, low perception of abilities, feelings of unattachment to one's team, and vulnerability in the

presence of their teammates (Martens, 1993). Last, a telling statistic is that attrition rates are extremely high, with around 25% of youth sport participants between 10 and 17 years old withdrawing from organized sport programs yearly. Clearly, a considerable disparity exists between the ideal outcomes of youth sport and the actual results. Similarly in physical education classes, identifying key aspects to ensure a favorable experience for youth sport participants has been the goal of many psychologists, educators, and researchers (Prichard & Deutsch, 2013). One variable that has received a substantial amount of attention for its potential omnipotence in the youth sport context is the motivational climate.

Achievement Goals

Research on achievement goals began in the late 1970s; Carol Ames, Carol Dweck, Marty Maehr, and John Nicholls explored individuals' purposes for engaging in behavior in an achievement situation. They conducted their research independently, but the four psychologists also exercised a collaborative effort that led to the identification of two types of achievement goals: performance goals and mastery goals. The goals represent two distinct reasons for approaching and participating in achievement tasks as well as different conceptions of success and outcomes (Ames, 1992).

Performance goals are based upon ability and a sense of self-worth; ability is believed to be nonmalleable and is demonstrated by outperforming others, surpassing normative-based standards, or achieving success with little effort (Dweck, 1986). Public recognition of superiority is especially important to performance-oriented achievement. Attention is directed toward achieving normatively defined success. When an individual adopts a performance goal, that person's self-worth is determined by his or her ability to perform and achieve the normative standard of success; consequently, expending effort may threaten their self-image when the outcome may be construed as failure (Ames, 1992).

In contrast, the purpose of behavior when mastery goals are salient is to develop competence and work toward task mastery. In this mind-set, individuals are oriented toward developing new skills, improving their competence, or achieving mastery based on self-referenced standards. The focus of attention is on the intrinsic value of learning and maximizing effort (Nicholls, 1989). Within the context of mastery goals, failure may be construed as helpful information in the process of learning and mastering a task (Elliot, 2005).

Motivational Climate

The nature of achievement goals is influenced by environmental or instructional demands. Research indicates that practice structures and coaches' behavior during training and games can affect the salience of a particular goal orientation and lead to its adoption (Ames, 1992). Called the motivational climate, an environment that promotes the salience of performance goals is fittingly called a performance-oriented motivational climate; an environment that supports mastery goals is referred to as a mastery-oriented motivational climate. Epstein (1989) suggested relevance of six achievement structures that can be modified to promote either a performance- or a mastery-oriented motivational climate: Tasks, Authority, Recognition, Grouping, Evaluation, and Time. The first letters of these structures create the acronym TARGET. These structures have been shown to influence the effort, persistence, cognitions, emotions, and behavior of individuals in youth sport (Ntoumanis & Biddle, 1999). These environmental structures are highly controllable by the coach, and the effects of their adjustment may be significant.

TARGET Descriptions

Tasks

Designing the tasks and learning activities is a key facet in forming the motivational climate in youth sport. Children's perceptions of tasks influence their approach to learning as well as affect how they use their time. Tasks that are challenging and diverse foster a willingness to put forth effort. When children perceive meaningful reasons for engaging in a task or activity (e.g., developing an understanding of the activity), they are more willing to pursue learning in a manner consistent with a mastery goal. Variety in task structure is simply more engaging and does not allow for complacency, which also allows less opportunity to engage in social comparison. Thus, performance differences among teammates are less likely to translate into perceived ability differences (Ames, 1992).

Authority

Authority is the locus of responsibility on a team. In a climate that promotes mastery goals, athletes are given decision-making opportunities and leadership roles, an environment in which the coach controls all decision-making power and supports performance goals.

Using rewards or other external sources of motivation to encourage children to engage in a particular activity or achieve certain results is also indicative of a performance-oriented motivational climate. In these cases, even if they demonstrate improvement or perceive their ability to be high upon completion, the reasons for participation are not likely to be intrinsic, but rather a means to an end as structured by the coach (Ames, 1992). To achieve the long-term goal of enjoyment leading to continued preference for athletic participation, this instant gratification is insufficient and ineffective. Suggestions to involve youth athletes in decision making include requesting input regarding prioritization of tasks and the pace or methods of learning. However, this delegation of responsibility must come with proper support from the coach for the preparation and application of a plan of action (Ryan, Connell, & Deci, 1985). Without this support, the experience of added responsibility and autonomy may be discouraging and counterproductive for children.

Recognition

Environments in which athletes are recognized privately and praised for their improvement and effort are characteristic of a mastery-oriented motivational climate. Making social comparisons or recognizing normative performances in front of an audience will certainly contribute to a performance-oriented climate (Ntoumanis & Biddle, 1999). For most athletes, receiving praise for improvement and effort helps to reemphasize the importance of the learning process. Using public recognition as a reward serves as an extrinsic motivator and is believed to steer children toward valuing the outcome over the process and emphasizing ability as a predetermined quality. Thanks in part to the increasing media coverage of sports and the adoration of “winners” in competitive athletics, coaches may find it challenging to minimize this type of recognition among youth sport participants, but to do so at a young age when developmental processes are malleable is important.

Grouping

Grouping youth sport participants with the intent to promote cooperative learning and peer interaction must be done regardless of ability for the climate to be perceived as mastery. If groups are formed based on ability, children are more likely to adopt performance goals and engage in maladaptive motivational responses. Such responses include attribution of failure to lack of ability or

learned helplessness; these responses to failure are based on the child's perception that the opportunity to succeed is not within their control (Dweck & Leggett, 1988).

Evaluation

The ways in which children are evaluated is one of the most influential factors on motivation (Ames, 1992). Depending on how evaluation is structured (i.e., standards, criteria, methods, and frequency of evaluation), young athletes may be oriented toward different goals and elicit different motivational approaches (Ames & Ames, 1984). In particular, social comparison is associated with the development of performance goals. Comparing scores, times, or accomplishments within a team can have detrimental effects on athletes' motivation. Children's self-evaluations regarding their ability are consistently more negative when they are focused on winning, outperforming their peers, or reaching a normative standard compared to when they are focused on giving maximal effort, improving their personal performance, or just participating (Ames, 1984).

Time

Whenever possible, allowing flexibility and ample opportunity to practice and complete a task increases the likelihood that children will form mastery goals (Ntoumanis & Biddle, 1999). On the other hand, allocating a uniform length of time for learning or completing a task supports the salience and formation of performance goals. Failure to complete an exercise in the allotted time can be interpreted as failure to meet the "normative" standard and can naturally lead to social comparisons.

Motivational Climate and Sport Participation and Enjoyment

Children participate in sports for a multitude of reasons. Mahoney et al. (2005) estimated that close to 45 million youth between ages 4 and 18 participate in organized sports in the United States. This makes it the most popular structured activity for youth participation. Over 10,000 children responded to a national survey in which they were asked why they participated in sports. The top two reported reasons for participation were to "have fun" and to "improve skills" (Seefeldt, Ewing, & Walk, 1992). Youth sport participants also frequently report social reasons for involvement. The development of close social relationships and having fun with others

were found to be strongly correlated with adolescents' reported level of interest and enjoyment in sport (Allen, 2003).

Coaches of youth sport strongly influence the nature and the quality of the sport experience. They contribute to the creation of the motivational climate by the goal priorities they promote, the attitudes and values they transmit, and the way they treat the members of their team. Coaching behaviors can have important effects on how children define success, which can be linked to the enjoyment and satisfaction they experience and influence the attitudes they form toward sport (Christianson, Breker, & Deutsch, 2012). The sizeable body of research on motivational climate in youth sport indicates that the development of a mastery-oriented motivational climate will cultivate maximum enjoyment, satisfaction, and intent for continued participation in children of all ability levels. As previously stated, enjoyment is a result of great importance to youth and affects their satisfaction and influences their intent for future participation.

Smith, Smoll, and Cumming (2007) conducted a study in which 20 youth basketball coaches attended a 75-min motivational climate workshop before the start of their season. During the training session, coaches in the experimental group were presented with behavioral guidelines and instructions to create a mastery-oriented climate among their teams. Coaches in the control group did not receive training or instruction. At the end of the season, children who played for the coaches in the experimental group reported decreased anxiety, whereas athletes who played for coaches in the control group reported an increase in anxiety as the season progressed. Performance anxiety has been associated with damaging effects, such as high levels of autonomic arousal, worry, and negative self-oriented cognitions. These stress responses have been shown to disrupt attentional processes and other cognitive functions (Smith, Smoll, & Passer, 2002). Perhaps the most alarming consequences of performance anxiety are high frequencies of organized sport avoidance, athletic burnout, and attrition. Based on this research, it appears that a mastery climate may minimize performance anxiety, therefore making it a viable tool to work toward high attainment rates in youth sport.

Support for the creation of a mastery climate has been corroborated in a number of other studies. For example, tennis players who perceived a mastery-oriented climate in their training also reported increased perceptions of ability and greater satisfaction with level

of play (Balaguer, Duda, & Crespo, 1999). Seifriz, Duda, and Chi (1992) examined the perceptions of high school basketball players and concluded that athletes who perceived a mastery climate on their team reported greater enjoyment of basketball. These athletes also expressed the belief that hard work and cooperation with teammates are affiliated with success in sport. The relationship between the perception of the mastery climate and the positive beliefs did not change across win–loss records. In this instance, enjoyment and satisfaction were not dependent on winning games. This is an encouraging finding because it appears that youth do not require normative-based “winning” outcomes to experience sport enjoyment.

The long-term effects of cultivating enjoyment and prolonged participation in sport have also been seen in relation to academic achievement. Eccles and Barber (1999) conducted a longitudinal study that followed over 1,000 individuals from sixth grade to age 25. After years of data collection, they found that the 10th and 12th graders involved in organized sport reported a stronger enjoyment of school than did nonathletes. Furthermore, individuals who participated in sports were significantly more likely to be enrolled in college at age 21 than their nonparticipating counterparts. For these young adults to participate in high school organized athletics, an enjoyment of sport was presumably developed in their youth and propelled their continued involvement. Eccles and Barber concluded that the development of traits such as self-esteem, cooperation, discipline, work ethic, and perseverance likely contributed to the resulting academic pursuit, enjoyment, and achievement. These results are important regarding the formation of favorable attitudes toward sport and the intent for continued participation as well as implications for career success.

Just as mastery climates can foster positive developments in youth sport participants, perceptions of a performance climate have been associated with negative experiences. Ommundsen, Roberts, Lemyre, and Miller (2005) surveyed over 1,700 adolescent Norwegian soccer players and examined their perceptions of the motivational climate and elements of social cohesiveness with their teammates. Ommundsen et al. found relationships between a perceived performance climate and a reduced quality of peer relations as well as decreased feelings of friendship with teammates. These findings indicate that in an environment in which intrateam rivalry is emphasized, a de-emphasis on collaborative effort and cooperation among team members can cause relations and friendships to suffer. Consid-

ering that two of the strongest factors that influence a child's desire to participate in sport are the development of close social relationships and having fun with others, a climate that negatively affects friendships and peer interactions would likely result in future avoidance of organized athletics (Allen, 2003).

Walling, Duda, and Chi (1993) examined the perceptions of motivational climates among 169 youth baseball, basketball, softball, and soccer participants. Athletes were administered questionnaires to determine the perceived motivational climate and related cognitive effects. The results show that a performance-oriented climate is associated with decreased satisfaction regarding team membership and increased performance anxiety. In all likelihood, young athletes who are not experiencing satisfaction with their team membership are more apt to discontinue their involvement. After all, the pursuit of a fun experience or time with friends likely initiated involvement in the first place. If their participation continues despite this lack of enjoyment, the dissatisfaction may evolve and grow into even stronger negative attitudes, ultimately resulting in extreme negative feelings toward organized sport participation.

Concerns About Youth Sport Attrition

The attrition rate brings to life the fears that an ineffective climate can have detrimental results on youth sport participation. Hedstrom and Gould (2004) reported that by age 15, an estimated 70% of children have quit participating in organized sport in the United States, with the yearly attrition rate around 25%. In Seefeldt et al.'s (1992) survey results, the majority of feedback children gave for quitting sports was directly related to the coach and the environment he or she created (e.g., "I was not having fun," "The coach played favorites," "Too much emphasis was placed on winning"). As mentioned previously, many children seek membership of a sports team to have fun and experience feelings of enjoyment, satisfaction, and accomplishment. It should come as no surprise that when their experiences do not match their emotional and social needs, they discontinue involvement. To address the discouraging attrition rates in youth sport, it may be advisable to focus on creating a climate that supports maximum enjoyment for the athletes (Ellenburger & Deutsch, 2014). This notion may seem outdated in a society that has become increasingly obsessed with championships and record-breakers, but children want to have fun when they are playing sports. The majority will not make their living by competing professionally,

so creating an environment suitable to train the next Michael Jordan or Mia Hamm alienates the children who simply want to enjoy being active, learning new skills, or developing meaningful relationships with their teammates. Instead, supporting continued participation through a climate that nurtures a desire to learn and rewards hard work is one of the most important roles of a coach.

Motivational Climate and Personal Development

In addition to cultivating the enjoyment and satisfaction necessary for prolonged sport participation, another primary goal of youth sport is to promote optimal psychosocial development. Ideally, personal development through sport participation

enables individuals to lead a healthy, satisfying, and productive life as youth, and later as adults, because they gain the competence to earn a living, to engage in civic activities, to nurture others, and to participate in social relations and cultural activities. (Hamilton, Hamilton, & Pittman, 2004)

However, there is a shortage of research in which youth sport participation has been linked to relevant personal development. MacDonald, Côté, Eys, and Deakin (2011) postulated that this may be in part due to the extremely recent development of a valid tool to measure personal development in sport participants: Youth Experience Survey for Sport (YES-S), adapted by MacDonald, Deakin, Eys, and Côté (2009).

In a study that was the first of its kind, MacDonald et al. (2011) used the recently developed YES-S to survey over 500 youth sport participants aged 9–19 in school or nonelite community leagues across a variety of team sports. These sports included baseball, basketball, curling, football, lacrosse, rowing, softball, synchronized swimming, and volleyball. The intent was to identify associations between perceptions of motivational climates and positive or negative personal developments. These developments included self-knowledge, goal setting, effort, time management, emotional regulation, teamwork, social skills, leadership, and diverse peer relations. The data suggest that the most important predictors supporting growth in these areas are related to a mastery-oriented motivational climate: positive affiliation with peers, maximum effort expenditure, and self-referenced competency. The strongest predictor of negative personal development was explicitly stated as the salience of a performance climate. These findings indicate that the climate created can be polarizing, having the potential for significant positive

or negative developmental effects (MacDonald et al., 2011). This study was the first in which a mastery climate was linked with the development of personal skills in youth of varying ages and sport affiliations. As discussed previously, the body of research in which enjoyment and mastery climate has been linked with prolonged participation in sport is well documented; however, to build a more conclusive body of literature, we recommend further research to identify the specific effects a mastery climate may have on particular areas of personal development (MacDonald et al., 2011).

Recommendations for Youth Coaches

Research conclusively indicates that a mastery-oriented motivational climate can foster beneficial cognitive and affective responses in youth sport participants, which may help achieve the goals of appropriate physical and psychosocial development. In situations in which a mastery climate was created, children reported greater enjoyment and satisfaction, increased perceptions of efficacy, reduced anxiety levels, and fulfilling social interactions. Implementing a mastery climate appears to be an effective and proven strategy toward achieving higher attainment rates in youth sport, a key step toward nurturing a healthy, confident, and well-developed generation (Bjorling & Deutsch, 2012).

The good news for coaches is that the motivational climate is remarkably controllable, and a significant amount of responsibility falls squarely on their shoulders to reverse the alarming trend of dissatisfied youth sport dropouts. Ideally, efficient and effective education will increase coaches' understanding and influence their actions. As mentioned previously, a onetime, 75-min instructional coaching session in which ways to form a mastery climate were addressed resulted in results that lasted an entire season for youth basketball players (Smith et al., 2007). Educational opportunities will unquestioningly help coaches grow, but a gentle reminder that most children are playing sports for reasons other than grooming their skills for a career as a professional athlete may go a long way. Children want to have fun. They want to feel good about themselves. All children, regardless of skill level, deserve these opportunities in a sport context. Creating a mastery climate presents an environment in which each team member is able to feel competent and successful because their effort is within their control. Supporting the pursuit of enjoyment and love of sports may be an easy but meaningful adjustment toward improved experiences for youth athletes. Perhaps this

small change can lead to extended participation and even greater developmental benefits for the next generation.

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TEACHER EDUCATION

A Comparison of Selected Supervisory Skills of Content Specialist and Non-Content Specialist University Supervisors

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Abstract

The purpose of this study was to describe and contrast selected approaches to the supervision of student teachers between Content Specialist and Non-Content Specialist university supervisors. Content Specialist supervisors were identified as trained university supervisors with a background in physical education. Non-Content Specialist supervisors were identified as trained university supervisors without a background in physical education. Both groups of supervisors assessed a prerecorded stimulus tape of an authentic physical education student teaching lesson. The supervisors were asked to complete a written critique of the lesson and engage in an interview to discuss individual supervisory behaviors, strategies, and conferencing techniques. Both groups displayed minor similarities in preparing for, documenting, and constructing critiques of a student teaching observation. However, the two groups displayed a greater degree of disparity in approaches taken to supervision, resulting in the establishment of notable differences between Content Specialist and Non-Content Specialist supervisors.

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Professional teacher education programs incorporate a variety of school-based practicum and field experiences into their curriculum. These experiences are designed to enhance the procedural knowledge base of teacher candidates through providing pre-service teachers with authentic training. In particular, practicum experiences afford pre-service teachers the opportunity to develop an autonomous teaching style under the supervision of experienced professionals. The culminating field experience, typically labeled student teaching, is widely considered by students and those involved with training teachers to be the most important component of all teacher education programs (Coulon, 2000; Griffin & Combs, 2000; Johnson & Napper-Owen, 2011; Koskela & Ganser, 1998).

Turney, Cairns, Eltis, Hatton, and Thew (1982) described student teaching as “the single most powerful intervention in a teacher’s professional preparation” (p. 47). Teachers themselves have commented that the student teaching experience was the variable that had the greatest influence on their development as a new teacher (Wilson, 2006). These acknowledgements are largely because the experience places pre-service teachers in a position to engage in authentic practices that prompt lasting changes in the behaviors (Wilson, 2006).

Because of the positive fundamental outcomes associated with student teaching experiences, student teaching has become highly regarded as an integral and instrumental component of the process of developing qualified teachers. Being such a foundational element of teacher development programs, this process requires continuous analysis for enhancement. If student teaching is truly the “capstone of pre-service training” as described by Anderson (2007, p. 307), teacher education programs should be incorporating all necessary best practice policies to make the experience as effective and efficient as possible. The purpose of this study was to describe and contrast selected approaches to the supervision of student teachers between content specialist and non-content specialist university supervisors to determine if a distinct difference exists between their approaches to supervision.

To clarify the university supervisor role within the student teaching experience, an overview of the student teaching triad roles will be presented. Also, content specialist university supervisors will be differentiated from non-content specialists university supervisors.

Student Teaching Triad

The student teaching triad is a collective body of three distinct members who work cohesively throughout the student teaching experience. The three roles in the triad are the student teacher, the cooperating teacher, and the university supervisor (Johnson & Napper-Owen, 2011; McIntyre, 1984; Murphy, 2010).

The student teacher, who has successfully navigated the content and methodology coursework of a particular discipline, engages in the student teaching experience, a culminating event of most teacher preparation programs. During student teaching, the student teacher will face general responsibilities that are often noninstructional in nature, specific responsibilities wherein compliance and successful navigation of the experience is mandatory based on university stipulations, observational responsibilities that promote meta-cognitive development, and teaching responsibilities that are used to demonstrate the student teacher's ability to assimilate into the role of practitioner.

The cooperating teacher, who is responsible for facilitating instructional and noninstructional practices in the authentic school setting, ideally works collaboratively with the university supervisor to develop the pedagogical content knowledge of the student teacher. Instructionally, the cooperating teacher is instrumental in providing day-to-day mentorship, guidance, and feedback to facilitate student teacher development (Veal & Rikard, 1998; Coleman & Mitchell, 2000; Johnson & Napper-Owen, 2011). In this regard, the role of the cooperating teacher largely coincides with the role of the university supervisor. However, the cooperating teacher role is distinctive from the university supervisor role in that cooperating teachers are the triad members predominantly responsible for facilitating noninstructional practices that are necessary in assisting the student teacher with the transition into becoming an independent teacher (Anderson, 2007). Grimmatt and Ratzlaff (1986) and Koskela and Ganser (1998) noted that the cooperating teacher largely provides the student teacher with information unrelated to instruction, that is, necessary for successful immersion into the school setting including school rules, policies, procedures, staff introductions, and tours of the school grounds. McIntyre (1984), Koskela and Ganser (1998), and Anderson (2007) further noted that the cooperating teacher is responsible for socializing the student teacher into the school community, promoting productive assimilation procedures that allow

the student teacher to feel welcomed and comfortable in the instructional setting.

The final member of the triad, the university supervisor, inhabits a position with a multitude of responsibilities. Under the majority of supervisory models, the dominant responsibilities of the university supervisor revolve around procedures connected to conducting scheduled visits and observations of the student teacher's performance at the host school setting. According to Metzler (1990), "Training and experience probably make the university supervisor the most qualified to deliver supervisory functions" (p. 40). These functions include preobservation meetings during which the student teacher and supervisor engage in dialogue concerning the events that will transpire during the lessons to be observed; the supervisor being familiar with a host of systematic observation instruments needed to record the necessary data displayed during the teaching experience accurately and effectively; and the supervisor's ability to structure postobservation conferences during which constructive, specific, congruent feedback is provided to the student teacher to further develop desired professional growth (Metzler, 2011).

Content Specialists vs. Non-Content Specialists

The role of the university supervisor has the potential to be filled by individuals who are either Content Specialists (CS), supervisors with a content-specific background in the area of placement for the student teacher, or Non-Content Specialists (NCS), individuals without a content-specific background in the area of placement for the student teacher. It has been presumed that NCS lack the technical language, systematic observation ability, and pedagogical content knowledge of a specialist supervisor (Metzler, 1990, 2011). This is potentially significant as Shulman (1986) stated that all three of the aforementioned variables, especially pedagogical content knowledge, are "instrumental in representing and formulating the subject matter in a comprehensible way to others" (p. 9). Hence, it is reasonable to argue that CS supervisors should assume the university supervisor role. Furthermore, Siedentop (1981), Strand (1992), and Metzler (2011) argued that supervisors who have been trained in the use of systematic observation methods for a particular context may be better suited to collect and interpret concrete data used in conferences with student teachers.

However, despite the presumed positive outcomes associated with the use of CS, a host of mitigating circumstances affect the ap-

pointment of university supervisors during student teaching practicum. One of the greatest obstacles impeding the use of CS appears to revolve around economic variables and the constraints on monetary and personnel resources plaguing schools, colleges, and departments of education. As these institutions are forced to stretch monetary and personnel allocations, best practice policies appear to suffer. As budget cuts continue and staffing roles are stretched, the university supervisor role in the student teaching experience appears to be largely filled by NCS supervisors. The effect this may have on the development of student teachers warrants attention.

Method

Participants

Twenty university supervisors (US), 10 CS and 10 NCS, were selected for participation in the study through a convenience sample. The 20 US were recruited from a large southeastern university in the United States. The CS group consisted of US with content-specific teaching and supervising backgrounds in physical education. The NCS group consisted of US with content-specific teaching and supervising backgrounds in educational fields other than physical education including elementary education, secondary education, higher education, counselor education, and library/media education. The two groups of US (CS and NCS) completed student teaching supervisory training at the same university under the Assisting, Developing, Evaluating, Professional Teaching (ADEPT) program. The ADEPT program is a formal, comprehensive student teacher assessment program. US are trained to evaluate student teachers in four domains: (a) planning, (b) instruction, (c) environment, and (d) professional development. Each domain consists of an unequal number of ADEPT performance standards, which are measures of specifically targeted knowledge, skills, and dispositions essential to teacher effectiveness. Participants were currently, or had been within the past year, working in a university supervisor capacity, evaluating student teacher performance.

Exclusionary criteria were implemented to avoid bias in the NCS population. NCS supervisors with prior physical education content knowledge, a strong background in the area of basketball (the student teaching instructional content area), and/or significant experience in coaching in general were eliminated from participation in the study.

The CS and NCS groups were determined to be similar in the areas of years acting in a supervisory capacity (CS: $M = 6$, $SD = .42$; NCS: $M = 5$, $SD = .48$), supervisory training (ADEPT trained), and gender representation (CS: eight female, two male; NCS: nine female, one male). However, the two groups were slightly different in terms of mean age and mean years working in the public school system in a teaching capacity. CS reported a mean age of 44, three years younger than the NCS mean age of 47. CS also reported a lower mean average of years working in the public school setting: 8 years to the NCS 1 year. These differences were determined to be minimal and unlikely to have a significant effect on study findings.

Design Overview

The current study is a follow-up to the 2000 investigation “Assessing Observation Focus and Conference Targets of Cooperating Teachers” (Coleman & Mitchell, 2000). As such, the following study design largely mirrors the procedures and protocols implemented in the aforementioned investigation. Twenty university supervisors, 10 CS and 10 NCS, were asked to independently (a) prepare for a mock student teaching observation as if it were an authentic experience, (b) observe a recording of an authentic student teaching lesson (stimulus tape), (c) complete a written critique of the observed lesson following ADEPT protocols, and (d) engage in a semistructured interview with the researcher following the observation to discuss supervisory behaviors, strategies, and conferencing techniques to be employed in a postobservation conference with the student teacher. Specifically, the intention of the study was to discern categorical variations that exist between CS and NCS supervisors’ approaches to student teaching supervision through an analysis of (a) how university supervisors approach planning for an observation, (b) how university supervisors look at specific aspects of a student teaching lesson, (c) to what university supervisors provide attention during a student teaching lesson, and (d) what strategies and/or techniques university supervisors implement when supervising student teachers.

Preobservation Assessment Protocol

Each US data collection session was conducted separately. Prior to the observation session and the viewing of the stimulus tape, US were provided contextual information regarding the placement site and population, along with background information concern-

ing the lesson and the student teacher. In this briefing, information was provided related to the student teacher's experience level, location within the teacher preparation program, amount of time at the current placement site, previous course grades, observed strengths and weaknesses related to teaching, and previous conference topics discussed. US were provided identical information from a scripted protocol, yet were invited to ask further questions deemed essential.

Following the dissemination of the contextual and background information, US were provided identical instructions via a written protocol for observing the stimulus tape. This protocol included four sections. First, participants were instructed on how to manipulate the playing device to pause, rewind, and fast-forward the stimulus tape if needed. US were also informed that the opportunity was available during viewing sessions to request clarification on topics related to the teacher or lesson from the researcher. Second, US were provided detailed written instructions (formal ADEPT guidelines) on what to prepare in terms of a written critique. Third, US were informed that a postobservation interview would be held with the researcher to discuss the written critiques completed. Finally, US were informed that the postobservation interview would also be used to discuss anticipated supervisory strategies they planned to implement if a post-observation conference with the student teacher were to take place.

Stimulus Tape Lesson

After the written protocol instructions were provided, US viewed the stimulus tape while in the presence of the researcher, who observed supervisory behaviors live, generating field notes on those behaviors displayed. The tape viewed by the US was an authentic student teaching experience of a basketball lesson taught to a fourth grade class. Supervisors were informed that the lesson was a representative account of consistent and prevalent behavior on the part of the student teacher at the elementary setting. The tape was determined an accurate audible and visual representation of a student teaching lesson, consistent with what a US would see and hear in an authentic student teaching observation.

Writing the Critique

US were directed to assess the lesson as an authentic caseload experience. US were free to employ those strategies that most suited individual styles. These included strategies such as preparing for the observation by bringing tools, supplies, observation instruments,

and assessment forms consistently used during observations and employing those tools as needed to collect data essential for written critiques. However, regardless of individual strategies implemented to supplement determinations of strengths and weaknesses of observed aspects of the lesson, US were requested to construct the final written critique of the lesson using the ADEPT recording instrument. These formal ADEPT reports were used as the basis for the discussions that ensued in the semistructured postobservation interviews between the researcher and the US.

Postviewing Interview

Following the viewing of the stimulus tape and the completion of the formal written critique, each US engaged in a semistructured interview with the researcher. These interviews were designed to procure two sets of data. First, US were prompted to elaborate on what was stated in the written critiques regarding the student teacher's strengths and weaknesses. This was an opportunity for US to offer rationalizations and justifications to support decisions made regarding observed desired behaviors requiring maintenance and undesired behaviors requiring remediation. Second, the interviews were used to ascertain what information the US focused on as areas of priority, the manner in which the US would structure or sequence comments to be made to the student teacher in a postobservation conference, and the conference environmental setting arrangement. This was an opportunity for the US to offer explanations regarding preference of conference style and approach. Scripted protocol questions were implemented to prompt US responses, and probing questions were used to elicit elaborations on specific decisions made regarding particular topics. Interviews were video-recorded and transcribed for analysis.

Data Collection and Analysis

Three primary sources of data were analyzed using qualitative procedures. First, the researcher generated field notes to outline observable approaches to the process of supervision implemented by the US. These field notes were generated while US were viewing the stimulus tape. In the field notes, the researcher recorded data identifying how many and what specific contextual and background questions US asked prior to viewing the lesson, which US brought instruments or assessments to the observation, what types of instruments were employed, whether the instruments were appropriate for

the lesson, and which US viewed the lesson in real time and which US displayed a propensity for controlled viewing options. Second, the researcher evaluated the written critiques generated by the US for identifiable similarities and differences related to prioritization of attention to observed student teacher strengths and weaknesses. Third, the transcribed postobservation interviews between the researcher and the US were evaluated for noticeable similarities and differences between the two groups' approaches to facilitating post-observation conferences.

The data sources were compared using strategies associated with the constant comparative method (Lincoln & Guba, 1985). Three phases of coding (open, axial, and selective) were implemented to analyze data sources. Each subsequent phase of coding was designed to reduce data from broad, general themes to more specific categories for comparison.

During open coding, each of the data sources for each US was analyzed to generate broad emergent themes. Graphic organizers were constructed to organize independent themes by US group (CS and NCS) and by data source (field notes, written critiques, and interviews). Table 1 categories are representations of the emergent themes identified representing strengths and weaknesses the US addressed in the written critiques.

During axial coding, specific topics observed, written, or discussed were organized into subcategories supporting each broad category. Subcategories were represented as exhaustive lists, addressing all major data points related to each broad category. Table 1 subcategories are representations of the specific topics identified representing strengths and weaknesses the US addressed in the written critiques.

Table 1
Critique Positive and Negative Comments

Categories and subcategories	Positive		Negative	
	CS	NCS	CS	NCS
Lesson Objectives	6	8	1	1
Appropriateness	6 (5%)	8 (7%)	1 (2%)	1 (2%)

Table 1 (cont.)

Categories and subcategories	Positive		Negative	
	CS	NCS	CS	NCS
ADEPT Standards	8	7	0	1
APS 1-9	8	7	0	1
	(6%)	(6%)	(0%)	(2%)
Instruction	10	10	9	9
Set-Induction	0	4	0	0
Scaffolding	0	6	0	0
Sequencing	0	3	0	2
Initial Tast	6	0	1	0
Extension Task	8	0	1	0
Refinement Tast	5	0	3	0
Application Tast	2	0	7	0
Assessment	0	2	7	6
Feedback	4	6	5	7
Cues	6	2	2	0
Demonstration	7	4	2	2
Checks for Understanding	4	3	4	4
Practice Time	7	5	2	2
Differentiated Instruction	3	1	0	0
	(40%)	(34%)	(57%)	(46%)
Management	10	10	3	2
Time	7	8	0	0
Transition	4	4	0	0
Structuring/Directing	4	0	3	0
Safety	3	2	3	2
Signals	6	9	0	0
	(19%)	(21%)	(10%)	(4%)

Table 1 (cont.)

Categories and subcategories	Positive		Negative	
	CS	NCS	CS	NCS
Student Teacher	9	10	4	8
Perimeter Movement	7	0	1	0
Proximity	3	2	2	8
Content Knowledge	5	8	3	0
Speaking Skills	3	4	3	4
Disposition	6	4	2	5
	(19%)	(17%)	(18%)	(34%)
Learners	9	9	5	6
Acquired Skills	6	7	5	0
Behavior	7	8	0	0
Movement/Interaction	1	1	3	6
	(11%)	(15%)	(13%)	(12%)

Note. CS = content special; NCS = non-content specialist; APS = ADEPT performance standard.

During selective coding, individual raw data units were organized into prevalence tables, representing which US addressed which topics and whether those topics were addressed positively or negatively. Table 1 percentages are representations of US prevalence rates of positive and negative comments addressed in the written critiques. The percentages generated during selective coding were the primary data units used for US group comparisons.

Reliability

Intrarater reliability was achieved through recoding four randomly selected participant data sources, two from each group, 2 weeks after initial coding. This process has been used in similar studies (Coleman & Mitchell, 2000). Recoding accuracy was established at greater than 90%.

Results

How Do University Supervisors Look at a Student Teaching Lesson?

The combined data sources of field notes, written critiques, and supervisor interviews indicated five distinct differences in how CS and NCS look at student teaching lessons. First, CS sought a greater amount of contextual information concerning a lesson to arrange the lens through which they view the lesson. During this study, CS made 62 distinct requests for additional contextual information compared to 30 requests NCS made. Some of these requests were similar, primarily including variations of “How long has the student teacher been at the current placement?”; “How has the student teacher performed up to this point?”; and “What feedback has the student teacher received so far concerning strengths and weaknesses?” However, CS consistently requested more in-depth information related to the lesson, asking questions concerning availability of equipment and space, learners’ previous engagement levels with the lesson content, class variability ranges with regard to inclusion practices for special needs learners and other high–low level learner populations, and information regarding the student teaching program at the time the video was recorded. These were articulated as being instrumental knowledge for aligning assessment procedures with the focus of a particular program, as program emphasis significantly affects the manner in which a student teacher implements teaching practices.

Second, CS displayed a propensity for watching a lesson in real time and NCS displayed a need for controlled viewing opportunities. This was evident through a comparison of the number of tape-stoppages observed for individuals in the two groups: a recorded 13 stops for CS and 76 stops for NCS. The majority of NCS stoppages revolved around two areas. Foremost, NCS appeared to struggle with maintaining focus on the lesson while writing notes, prompting the majority of NCS to pause the tape when taking notes. Second, NCS stoppages were used to rewind the video to provide the viewer with extra opportunities to observe events of perceived importance that were missed. CS stoppages primarily revolved around direct clarification questions regarding information provided prior to viewing the lesson, such as “You said he was here for three weeks?” after noticing the student teacher’s inability to use students names during instruction.

Third, CS displayed tendencies for observing a greater number of critical features in a lesson, which corresponded to a greater number of scripted observations in critiques. This was evident through an analysis of the scripted observations generated by the US, in which the CS critiques were found to be twice as long, containing twice the amount of information of the critiques generated by the NCS. This information was largely centered on salient features related to the lesson task progression, in which CS were descriptive with identifying and discussing strengths and weaknesses related to extension, refinement, and application tasks.

Fourth, the level of specificity demonstrated in the CS written critiques appeared to be instrumental in aiding CS with prioritizing conference discussion topics related to observed strengths and weaknesses. In structuring conference topics by perceived priority, CS appeared to be capable of adding a level of depth to postobservation conference discussions that was not evident in NCS conference plans.

Fifth, CS used a vocabulary that was different from NCS in the construction of critiques, displaying the ability to use a content-specific technical language to represent subject matter.

What Do University Supervisors Look at During a Student Teaching Lesson?

Based on the written critiques, US within both groups displayed a propensity for providing significant attention to four distinct areas during observations. As is readily identified in Table 1, US provided the greatest amount of attention to instructional aspects of the lesson, classroom management, the student teacher's behavior and disposition, and the learners themselves.

Table 1 categories and subcategories are representations of topics US addressed in the written critiques. The underlined numbers in Table 1 represent the number of US per group making a statement concerning each main category. The subsequent numbers corresponding to each subcategory represent the number of US in each group specifically commenting upon those particular areas. For example, under the main category of Student Teacher, nine CS and 10 NCS stated positive remarks concerning the student teacher. Seven of the nine CS remarked that perimeter movement was a positive aspect of the student teacher's instructional performance, whereas none of the NCS noted perimeter movement as a positive aspect of instructional performance. CS positive remarks regarding student

teacher behavior accounted for 19% of CS positive written observations.

Strategies and/or Techniques University Supervisors Use When Facilitating a Conference

The analysis of the postobservation interview transcripts revealed five significant differences in the strategies and techniques CS and NCS employ to facilitate student teacher conferences.

First, an evaluation of the logistical concerns affecting conferences resulted in noted differences between the two groups. The groups had different opinions related to how long a postobservation conference should last and what should be addressed during the conference. The length the CS stated for conferences with the stimulus tape was considerably longer than the reported conference lengths the NCS noted: approximately 60 min for CS and 30 min for NCS. CS expressed a favorable opinion for discussing fewer topics in greater detail, specifically focusing on prioritized areas of perceived weakness requiring remediation. NCS, on the other hand, expressed a favorable position for covering an exhaustive number of witnessed strengths and weaknesses, only with a minimal degree of specificity, using primarily a listing approach.

Second, the two groups of supervisors displayed differences with comments related to the tone and atmosphere required for conference proceedings to be effective. CS were adamant that the setting should be formal and student teacher directed—supervisor facilitated. However, CS identified numerous practical explanations for why their personal preference for conference direction is limited by individual student teacher characteristics. These explanations primarily revolved around the notion that the degree of facilitation required to guide a conference is dependent on the level of active engagement the student teacher displays. NCS, on the other hand, were divided on their conference format preference. Half voiced favorable opinions for formal settings that were supervisor directed, and the other half favored informal settings that were student teacher directed. The NCS decisions were unanimously based on supervisor personal experience and preference rather than student needs or other contextual variables.

Third, variations were noted with regard to promoting the maintenance of observed areas of strength during conference proceedings. CS supervisors voiced a preference for using reflective approaches that used contextual information to reinforce continued

practice through synthesizing the importance and significance of desired practices. NCS supervisors voiced a preference for using a positive reinforcement procedure that simply stated approval of observed positive practices.

Fourth, with regard to remediation techniques for areas of perceived weakness, both groups voiced a variety of strategies for achieving desired goals. Consistently, US in both groups stated that all areas of remediation should be addressed with constructive, professional, positive tones. However, CS were more direct in their approach to handling remediation, stating clarification of weaknesses and explicitness, with corrective strategies as significant factors in fostering remediation of weak areas of performance. NCS were more indirect in their approach, stating a preference for leaving the student teacher to determine if discussed areas of perceived weaknesses required further attention for improvement. In such instances, the student teacher would be provided with multiple options to consider for enhancing instructional aspects, but would ultimately be left alone to make a final decision on a plan of action.

Finally, variations were found between the two groups in relation to the preference of use of systematic observation instruments in conference proceedings. CS expressed favoring objective assessment measures such as systematic observation instrumentation to validate conference discussion topics. NCS expressed favoring subjective assessment procedures such as simple observations, mental checklists, and anecdotal recordings to guide conference proceedings. NCS never discussed the notion that student teachers may question the validity of supervisor comments based solely on subjective assessment procedures.

Discussion

How Do University Supervisors Look at a Student Teaching Lesson?

An analysis of supervisors' requests for contextual information prior to an observation indicates that CS approach observations with a different perspective than NCS. It is apparent that CS possess finer discriminatory capabilities than NCS, which are expressed through an ability to be more inquisitive about the student teacher, the environmental setting, the learning population, and intricate details associated with the lesson. Sizer (1984) noted that this heightened sense of finer discriminatory capabilities is crucial to effective

supervision. The CS consistency in requesting specific information indicates that such solicited information is essential data for observing and analyzing the student teacher and the student teaching lesson. Therefore, CS may be placing themselves in a better position to assess student teaching experiences analytically through requesting contextual information, which directly enhances the discriminatory lens through which the lesson is viewed.

Along with the noted variation in preparatory strategies, the two groups displayed contrasting approaches for observing the lesson. The CS displayed an affinity for viewing the stimulus tape in real time. The NCS, on the other hand, consistently displayed an affinity for manipulating the playing device to pause and review intricate aspects of the lesson. Therefore, the NCS as a group required significantly more time than the CS group to view the student teaching lesson. Because student teaching observations generally occur in live contextual settings, in which US are not afforded ideal circumstances associated with audio-video recordings, CS appear to be in a position to be more efficient with supervision responsibilities. Furthermore, the level of efficiency displayed by the CS indicates that they respond to stimuli more quickly due to the ability to function at a level of automaticity within a content-specific area of focus, which is a trait associated with expertise (Siedentop & Eldar, 1989).

CS also displayed the ability to witness and record a greater number of strengths and weaknesses in the lesson with greater specificity than the NCS. Thus, it is apparent that CS are more adept than NCS at identifying critical and salient features within a lesson. This ability is directly related to Sizer's (1984) and Siedentop and Eldar's (1989) claims that expertise is a matter of fine stimulus control in which experts see things that nonexperts do not see due to enhanced meta-cognitive capabilities associated with a particular content area.

A variation was also noted between the two groups in the technical language applied to written critiques and verbal responses. The technical language consistently implemented by the CS was in accordance with terms, concepts, and vocabulary associated with the content of the student teaching subject matter. Examples are evident in Table 1, under the Instruction category, as CS consistently referred to all four sections of the standard physical education task progression, whereas NCS never mentioned these foundational lesson components. The NCS language, however, was predominantly laden with general education terminology, which is recorded in Table 1. This finding reinforces the notion that CS within the field

of physical education can articulate and rationalize observations of performance more effectively than NCS. Shulman (1986) referred to this type of ability displayed by the CS as pedagogical content knowledge, which he noted as “representing and formulating the subject to make it comprehensible to others” (p. 9).

What Do University Supervisors Look at During a Student Teaching Lesson?

Both groups of supervisors reported that a proactive approach was implemented with observation strategies in which specific events, actions, and behaviors were sought out for evaluation in the student teaching lesson as opposed to taking a more holistic approach to observation in an attempt to identify emergent areas of strengths and weaknesses. The dominant categories receiving attention were Instruction, Management, Student Teacher, and Learners. CS, displaying finer discriminatory capabilities, were more detailed in their identification of subcategories pertaining to each main category and more consistent as a group in identifying areas of subcategories. This ability further indicates that CS approach student teaching observations with a more consistent and critical perspective than NCS, a notion reinforced by Glaser and Chi (1988), who stated that experts have the ability to visualize domain-specific components at deeper levels than novices, who generally only see the superficial levels. With this ability, CS have the potential to be in a position to acquire significantly more relevant data than can NCS, which is necessary in facilitating functional postobservation conferences that are constructive in advancing the pedagogical skills of student teachers.

Strategies and/or Techniques University Supervisors Use When Facilitating a Conference

Logistical concerns. CS voiced the opinion that conferences should be held the same day as the student teaching observation, ideally immediately after the observation. This position parallels that of the physical education instructional supervision model (Metzler, 1990), in which timely feedback on performance is required to prompt desired improvements in teaching practices. Contrastingly, NCS expressed a preference for a reflection period of between 2 and 4 days to prepare for the conference, a time potentially beyond the timely feedback range. CS and NCS also had different opinions concerning conference length. CS stated that conference length was

conditional, being dependent on the amount of content requiring discussion. NCS, on the other hand, tended to attempt to schedule conferences by self-imposed time limitations rather than content. Coincidentally, CS expressed that topics for discussion should be arranged by necessity and priority and subsequently discussed with a level of depth required to foster maintenance of desired practices and remediation of undesired practices. Conversely, NCS expressed a mentality favoring the coverage of all identified areas of strengths and weaknesses, but with minimal depth, within a specific time frame.

Conference tone. CS were in agreement that the postobservation conference should follow a formal, structured process. These supervisors were in agreement that the conference was the most crucial aspect of the student teaching experience and thereby should be planned meticulously, organized with a set direction, and ultimately specifically focused on achieving identified outcomes to enhance instructional skills. NCS expressed a preference for facilitating informal conferences, which were described as being representative of authentic conference settings in which teachers were likely to engage in real-life scenarios. They believed that this style of conferencing was more collaborative and less one dimensional, and thereby, the level of reciprocity achieved through informal conferencing was foreseen as fostering higher rates of engagement and ownership on the part of the student teacher.

Maintenance of strengths and remediation of weaknesses. CS expressed a preference for facilitating reflective procedures to foster maintenance of desired practices, whereas NCS expressed a preference for using positive reinforcement to maintain strengths. CS were adamant in specifying that reflective procedures were instrumental in using authentic experiences to solidify the procedural knowledge base and thereby foster the continuation of desired practices and behaviors. CS also expressed a more detailed approach for remediating weaknesses. Only areas of priority were to be specifically identified and focused on for change. Clarification for the student teacher as to why a behavior or practice was undesirable was viewed as an essential step in fostering change. With the area of weakness identified, clear feedback was deemed essential for relating what the CS wanted to see changed and how that change should occur. NCS favored a more indirect approach to remediating areas of weakness. A comprehensive approach was favored for listing all noted areas of weakness to bring them to the attention of the student

teacher. Once topics were identified, a brief collaborative discussion would be used to provide the student teacher with options to consider for possible solutions to perceived areas of weakness, with no discernible focus on prioritization.

Assessment measures. CS expressed a favorable approach for implementing objective assessment procedures. CS identified objective systematic observation instruments as being more accurate, carrying more weight in the conference, and being more convenient for pre–post comparisons to note behavior changes than nonsystematic or subjective data collection techniques. NCS tended to favor subjective observation assessment procedures, relying heavily on individual observational skills such as eyeballing and anecdotal recordings, in both preference and practice. However, the identified observable behaviors of the CS under the conditions of this study indicate that a potential disconnect may exist between espoused preference and actual practice with assessment procedures. CS were observed favoring subjective assessment procedures while conducting observational recordings during this study.

Conclusions and Implications

The student teaching experience is the capstone event of teacher preparation programs. As such, continuous evaluation of student teaching is necessary to promote best practice policies. The examination of the data collected during this study resulted in three significant conclusions and implications related to best practice policies with regard to university supervision.

First, CS saw more detail in less time. From a pragmatic perspective, this economy of time yields greater efficiency of effort, which matters when assigning multiple student teachers to individual supervisors. The level of automaticity the CS displayed in this study, coupled with a display of finer discriminatory capabilities, indicates that CS possess characteristics associated with expertise as defined by Siedentop and Eldar (1989) and Ericsson, Krampe, and Tesch-Römer (1993). Hence, CS appear to be in a position to be more efficient university supervisors.

Second, CS tended to focus conference attention on specific, immediate teaching skills, whereas NCS tended to focus conference attention on general professional development. As student teaching is the final preparatory experience offering pre-service teachers the necessary skills to hone their craft, it stands to reason the emphasis of supervision during student teaching should lie on the enhancement of teaching skills over autonomy development.

Third, CS expressed a preference for holding a postobservation conference on the same day as the observation to provide immediate feedback. NCS, on the other hand, preferred to allow time for themselves and the student teacher to process the lesson before holding a conference. Both practices are products of preference and time, but the current prevailing supervisory mentality aligns with Metzler's (1990) notion that "an effective supervisory approach implements a system where the performance data that are collected and analyzed are presented in post-observation conferences immediately following the teaching session" (p. 31). Hence, there may be merit to evaluating programmatic mandates on acceptable latency periods between observations and conferences to ensure that student teachers are receiving timely feedback. In combination with this conclusion, this finding signals the need for at least periodic auditing of the performance of university supervisors to ensure that behaviors are consistent with program goals.

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TEACHER EDUCATION

A Conceptual Model of Observed Physical Literacy

Dean A. Dudley

Abstract

Physical literacy is a concept that is gaining greater acceptance around the world with the United Nations Educational, Cultural, and Scientific Organization (2013) recognizing it as one of several central tenets in a quality physical education framework. However, previous attempts to understand progression in physical literacy learning have been limited to preexisting knowledge and psychosocial and physical assessment instruments and have been proved to be less than complete in the understanding of this construct. The aim of this article was to present a unique conceptual model of observed physical literacy and establish an assessment rubric on which future assessment protocols may be based. Seminal definitions of physical literacy and numerous models of physical education instruction were reviewed to establish common core elements of physical literacy. These core elements were then viewed through a Structure of Observed Learning Outcomes (SOLO) taxonomy lens to establish an assessment rubric that may be applied to extend understanding of student learning within this construct. The established core elements of physical literacy and the application of the SOLO taxonomy provide a potentially useful tool for future assessment item development.

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According to Whitehead (2013), physical literacy can be described as a disposition to capitalize on the human embodied capability wherein the individual has the motivation, confidence, physical competence, knowledge, and understanding to value and take responsibility for maintaining purposeful physical pursuits/activities throughout the life course. Whitehead's (2013) definition is important in understanding how the construct of physical literacy is likely to manifest as a result of the learning students undertake during formal education programs. It also captures the central thesis of physical literacy expressed in other popular Organisation of Economic Co-operation Development (OECD) physical education (PE) instruction models adopted around the world. Many OECD nations even include references to specific curriculum models such as teaching games for understanding (Bunker & Thorpe, 1982), sport education (Siedentop, 1994), and teaching personal and social responsibility through physical activity (Hellison, 1983). However, those adopting any one of these models alone cannot support the multidimensional (cognitive, affective, and psychomotor) and interactive nature of the physical literacy construct, which has yet to be effectively articulated in a manner that has facilitated its application for effective pedagogical or assessment purposes.

Previous attempts to understand progression in physical literacy learning have been limited to preexisting knowledge, psychosocial and physical assessment instruments, or combinations thereof (Tremblay & Lloyd, 2010) and hence restrain understanding of the contemporary physical literacy construct to that which is already known within these domains.

Furthermore, many have argued that physical literacy is an individual journey, and therefore, observable assessment of such a construct is problematic beyond the psychomotor domain of observed behavior (International Council of Sport Science and Physical Education, 2013). However, the 20th century Dutch mathematician and psychologist George Rasch refuted the premise that any learning is beyond human ability of observational assessment. He posited in his seminal work that the manifestations of learning of a given person to a given stimulus of a certain set of allied stimuli can be observed and measured by allocating a parameter characterizing the person and a parameter characterizing the stimulus. It is then possible, in the analysis of the data, to detach the personal parameters from the stimulus parameters, and vice versa (Rasch, 1960). These are the manifestations of observed personal physical literacy that I

sought to articulate by assigning parameters characterizing physical literacy behaviors and their related stimuli.

In this article, physical literacy is not a concept strictly limited to the learning described within a PE curriculum. On the contrary, it was found in a previous systematic review of effective PE and school sport curricular interventions that many of the core outcomes these curricula set out to achieve (i.e., increasing physical activity participation and developing movement skills) are better addressed in a holistic and cross-curricular way (Dudley et al., 2011). Physical literacy should therefore be seen as a journey that a school and its wider community can service.

Core Elements of Physical Literacy

Physical literacy should be viewed as an umbrella concept that captures the knowledge, skills, understandings, and values related to taking responsibility for purposeful physical activity and human movement across the life course, regardless of physical or psychological constraint. The proposition in this paper is that there are four core elements contained within a model of physical literacy that can manifest in observable student behavior and be assessed via an evidence-derived observed learning taxonomy. Those core elements are (a) movement competencies; (b) rules, tactics, and strategies of movement; (c) motivational and behavioral skills of movement; and (d) personal and social attributes of movement (see Figure 1).

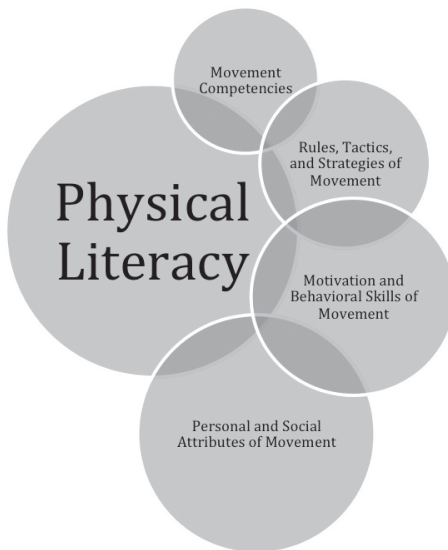


Figure 1. Core elements of physical literacy.

Each core element represents a loose progression from simple to complex in the physical, cognitive, and affective learning domains. Furthermore, students do not necessarily progress in a strictly linear fashion, but rather the focus is on the relationship and learning that exists among the elements. In fact, the Structure of Observed Learning Outcomes (SOLO) deconstruction of each element demonstrates that students are capable of being at different metacognitive points within each element simultaneously. The elements, however, provide relevant scaffolds for planning lessons, activities, and assessments for students and individualizing learning programs.

To explain the nesting of the physical literacy elements, I will use a Russian (Matryoshka) doll metaphor used by Quay and Peters (2009) in their unpacking of the relationships that exist among models of instruction in PE. Throughout the physical literacy model described here, the four elements are entwined together into a reasoned compendium. They do not exist as separate resources to sit on a teacher's desk or to be selected according to a particular focus the teacher believes should be taken. They are deliberately described here as supporting each other and designed to be implemented in a sequence that weaves a meaningful context within which curriculum, co- and extracurricular content, and school environment become means to the students' ends in demonstrating their physical literacy.

To use the Quay and Peters (2009) analogy, the relationship among these concepts can be perceived metaphorically as a Russian doll, each one sitting inside the other (see Figure 1). They nest together to constitute cascading elements of purpose and meaning for students that, in practical terms, form a unified whole. Most important, however, this nesting begins not with the smallest doll, the movement competency, but with the largest doll, the personal and social context, which underpins the deeper and more purposeful interests of each student. This notion also links closely with Whitehead's (2010) discussion on the existential nature of physical literacy and that people create themselves through their interactions with the world around them.

Consistent with Whitehead's (2013) definition of physical literacy, bringing together these four core elements can only be achieved by beginning with the motivation and interests of students, attempting to connect students with their learning through their own interests and thus through the inherent meaning attributed by the student to the tasks and content involved. This is a process of attribution

through purpose that the teacher can influence via the structure of any teaching and learning strategy.

The teaching practices at the center of this physical literacy model enable a connection to be made with students' lives beyond merely the school context. Other contexts that engage students in personal, social, and physical ways become intimately connected with their journey in achieving physical literacy. This includes community and organized sport, but it is also the evident link with a students' play during school recess periods and less organized play that occurs at home and outside school hours when they do not require teacher input and require only minimal equipment that can easily be made available and therefore allow physical literacy to be played, practiced, enacted, and important, assessed. These understandings and abilities will also play an important role in peoples' lives after their formal years of schooling, enhancing the available opportunities for more physical activity across the life course.

A Metacognitive Model for Observing Physical Literacy

Recognizing that physical literacy is a complex phenomenon can make developing any assessment framework difficult. Effective assessment models and rubrics are grounded in effective models of metacognition (Biggs, 1999). Popular metacognitive models such as Bloom's taxonomy of learning objectives (Bloom, 1956) and the later revisions by Anderson (2005) were primarily concerned with the cognitive domain of learning. Even though adaptations were constructed for the affective (Krathwohl, Bloom, & Bertram, 1973) and psychomotor domains (Simpson, 1972), they remained plagued by lack of empirical support as to their validity and reliability at distinguishing between the learning domains, confusion with levels of knowing and forms of knowledge, and endemic semantic misinterpretations when used by teachers (Colder, 1983; Hattie & Purdie, 1998).

To describe a progression of increasing cognitive, affective, and psychomotor complexity for each of the core elements of physical literacy outlined in this article, a metacognitive model was sought that was not limited to any one of the aforementioned learning domains. In essence, the selected metacognitive taxonomy had to address all three learning domains simultaneously to address the multidimensionality of the physical literacy construct. For this reason, within each proposed physical literacy core item (Figure 1) is

an embedded dissection of observed learning behaviors using the SOLO taxonomy proposed by Biggs and Collis (1982). The SOLO taxonomy was used to understand the metacognitive complexity of physical literacy because it has been used to measure teacher understanding of PE pedagogy effectively (Baxter & Dudley, 2008; Dudley & Baxter, 2009, 2013; Dudley, Drinkwater, & Kelly, 2014) and to assess student understanding of concepts related to PE (Hook & Richards, 2013a, 2013b). Furthermore, the SOLO taxonomy (Biggs & Collis, 1982) is a metacognitive “model that values a balance of surface and deep learning” quantitatively and qualitatively (Hattie & Brown, 2004, p. 3), and unlike other learning taxonomies, it is not limited to any one domain in its application.

The SOLO taxonomy is based on Piagetian descriptions of learning and was constructed by observing the developmental pattern of student behaviors and responses in relation to a variety of school subjects. It is widely used by both schools and universities, most notably in Australia and New Zealand. It has been evaluated as particularly applicable to the measurement and categorization of levels of conceptual understanding (Boulton-Lewis, 1998; Chan, Tsui, Chan, & Hong, 2002; Hattie & Brown, 2004).

Biggs and Collis (1982) described the five SOLO levels as follows:

1. Prestructural (no understanding)
2. Unistructural (understanding of one element)
3. Multistructural (understanding of a number of elements but not the pattern of relationships between them)
4. Relational (understanding of the links between the elements)
5. Extended abstract (the ability to relate the concept to contexts and other concepts)

Relational and extended abstract responses have been linked to the conception of deep learning, whereas unistructural and multistructural responses reflect surface approaches (Hattie & Brown, 2004, pp. 5–6; Ramsden, 2003, p. 57).

Biggs and Collis (1982, p. 217) also maintained that SOLO levels were discernible in the Piagetian modes (sensory-motor, intuitive, concrete symbolic, and formal).

The SOLO taxonomy provides a rigorous, well-evidenced (Killen, 2005), and practical learning model that informs the powerful pedagogical approach of constructive alignment (Biggs, 1999). For this reason, it can be used to enhance understanding of physical lit-

eracy across the compulsory and noncompulsory years of schooling as it informs planning and monitoring student achievement and provides a universal understanding of assessment.

Personal and Social Attributes of Movement

Don Hellison (1983) best described the importance of teaching the personal and social attributes of movement in his seminal work on the issue. Past and present PE, sport, and even political leaders have claimed that a number of personal and social benefits can be derived from participation in physical activity. The rhetoric of “sport builds character” and “play fair in class and you will play fair in life” are rooted in the educational testimonies of Thomas Arnold from the 19th century Rugby School and the ideals of Olympism spruced by Pierre de Coubertin. Unfortunately, this rhetoric and other idealistic claims about PE and sport are outdone by evidence sourced empirically (Rees, 1990).

According to Hellison (2003), however, this evidence and rhetoric is not to say that the potential for social benefit from physical activity is nonexistent. It is, however, a risky proposition to assume that such outcomes are achieved through mere participation in physical activity.

The holistic nature of physical literacy speaks to the potential learning that can occur through movement. According to Noddings (1992), this also coincides with the holistic nature of physical activity wherein the physical self is articulated still as only part of the self. The emotional, spiritual, and intellectual self must also be a concern, and clearly these are not discrete. Noddings also stated that it was a mistake to try and separate them sharply in the application of curricula.

Hellison (2003) also stressed that the conceptualization and implementation of teaching and learning of social responsibility through movement may be difficult because they involve more than a list of behaviors in a single context. However, he identified five hierarchical components of social responsibility an individual can exhibit (see Table 1).

Table 1
Personal and Social Attributes of Movement

Hierarchical level	Personal and social attributes of movement
Level 1	Respecting the rights and feelings of others Self-control Right to peaceful conflict resolution Right to inclusion
Level 2	Participation and effort Self-motivation Exploration of effort and new tasks Courage to persist
Level 3	Self-direction On-task independence Goal-setting progression Courage to resist peer pressure
Level 4	Helping others and leadership Caring and compassion Sensitivity and responsiveness Inner strength
Level 5	Outside the gym/formal learning environment Transfer into other areas of life Being a positive role model for others in how you live your life

Note. Adapted from *Teaching Responsibility Through Physical Activity* (2nd ed.), by D. Hellison, 2003, Champaign, IL: Human Kinetics.

Motivational and Behavioral Skills of Movement

Whitehead (2010) supported the notion that motivation to maintain physical activity across the life course is an important variable to consider in the physical literacy context. One of the primary reasons youth participate in physical activity is for the sheer enjoyment they experience while moving in social situations and interacting with their peers, but the concept of promoting personal and intrinsic motivation also needs investigation. Many researchers agree that intrinsically motivated youth are more likely to perceive their movement experiences as positive and therefore lead more active lifestyles (Biddle, 2001; Kilpatrick, Herbert, & Jacobsen, 2002; Weiss, 2000).

In their seminal work, Ryan and Deci (2000) described human beings as being proactive and engaged or passive and alienated from their personal health and well-being, promoting behaviors largely as a function of the social conditions in which they develop and function. They postulated that three innate psychological needs exist: competence, autonomy, and relatedness. When these needs are satisfied, they potentially yield enhanced personal motivation toward improved personal behaviors that promote health and wellness, but when they are not satisfied, they potentially lead to diminished motivation, health, and well-being.

The hallmark of physically literate individuals is that they foster a love of physical learning, so they seek physical challenges, value physical effort, and persist in the face of physical obstacles. Physical literacy therefore seeks to develop an individual's intrinsic motivation to pursue these values.

Current research indicates that development of students' intrinsic motivation has been associated with increased intentions to engage in health and skill promoting movement such as exercise (Standage, Duda, & Ntoumanis, 2003), step counts during PE classes (Lonsdale, Sabiston, Raedeke, Ha, & Sum, 2009), and physical activity during leisure time (Gordon-Larsen, McMurray, & Popkin, 2000; Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003).

Rules, Tactics, and Strategies of Movement

Challenging students to find solutions to problems is a central feature of a tenable understanding of physical literacy. This teaching practice is engaged when students are faced with the dilemma of how to improve their own and their team's performance. The rule-bound tactical and strategic structure of game play and recreation now require investigation by the physically literate student.

The attention with rules, tactics, and game strategies and the creation of a model for addressing them in education have been attributed to Bunker and Thorpe (1982). These pioneering educators built on previous advances, bringing together aspects of a growing dissatisfaction with a limited focus on skills or techniques to develop their model. Table 2 shows how rules, tactics, and strategies are classified in a physical literacy context. They are hierarchical in nature, with strategy being the most complex cognitive task, followed by tactics and rules, which govern a game or physical activity.

Rules may be defined as the "means to an end, and to achieve the end by other means is not playing the game" (Grehaigne, Richard, &

Griffin, 2005). Tactics are the operations the players voluntarily execute during the game to adapt to the immediate requirements of an ever-changing opposition. It involves the spontaneous actions that occur during the game or those organized through a predetermined response strategy (Grehaigine et al., 2005). Strategy is different from tactics in that it is the plans, principles of play, and action guidelines decided upon before a game or activity. Strategy is associated with more elaborate cognitive processes because the decisions made are based on reflection and research without time constraints. Tactics operate under strong time constraints (Grehaigine et al., 2005).

Table 2

Classification of Rules, Tactics, and Strategies in a Physical Literacy Context

Hierarchical levels	Classification of rules, tactics, and strategies
Level 1 Rules	Rules are a means to an end, without which a game or organized physical activity may not exist or be accepted Fundamental/primary rules of team games and sports (Grehaigine et al., 2005, p. 4) Safety and ethical rules of organized physical activity
Level 2 Tactics	Tactics are the operations the participants voluntarily execute during the game to adapt to the immediate requirements of an ever-changing opposition, their spontaneous actions, or those organized through a predetermined strategy Offensive and defensive tactics of team games and sports (Grehaigine et al., 2005) Quality and efficiency tactics of organized physical activity
Level 3 Strategies	Strategies are higher order cognitive processes based on reflection and research Offensive and defensive strategy of team games and sports (Grehaigine et al., 2005) Quality and efficiency strategy of organized physical activity

Bunker and Thorpe (1982) described their alternative model as the teaching games for understanding (TGfU) model. Within the TGfU model, there are six basic phases: game, game appreciation (rules), tactical awareness, making appropriate decisions, skill execution, and performance. These phases act as a pedagogical framework for teachers to follow when employing the TGfU approach.

For students to understand the notion of rules, tactics, and strategies, Bunker and Thorpe (1982) also underpinned their TGfU model with the games classification system (GCS). The GCS essentially classifies most sports into one of four categories of similar tactical intent: (a) target games, (b) net/wall games, (c) striking/fielding games, and (d) invasion/territorial games. As the GCS is hierarchical, it is a useful model for understanding the complexity of tactical and strategic performance required in activities that fall within those classifications. It is, however, limited as a universal model to be applied to physical literacy because only dominant sports and popular forms of game play are captured in the model.

If it is accepted that a student's ability to understand rules, tactics, and strategies is an important progression in the physical literacy continuum, it also needs to be recognized that these opportunities present themselves in activities beyond conventional team games and sport.

Many recreational activities and sports that exist beyond the GCS require participants to follow rules, adopt tactics to adapt to their immediate requirements, and employ strategies to improve the likelihood of successful performance. To illustrate my point, consider surfing. Surfing sits outside conventional understanding of the GCS to show how rules, tactics, and strategic decision making are imperative to performance and capable of observation using a SOLO rubric.

Surfing has long been prided as a sporting and recreational activity that sat beyond the rules and conventions of modern life (Taylor, 2007). Its subculture of rebellion, however, now requires participants to observe a strict code of conduct that is enforced by other surfers and not referees or umpires. Before new surfers even enter the water, they are expected to understand rules such as (a) right of way, (b) not dropping in, (c) paddling behind, (d) not ditching, and (e) respecting the lineup. These rules are as important to achieving the "means to an end" as is the game appreciation phase in the TGfU model for more conventional sporting participation.

Unlike players in many team games, surfers adopt tactics that allow them to overcome the prevailing conditions to improve the

quality and efficiency of their surfing experience. Therefore, in terms of tactics, surfers employ several operations voluntarily, or adapt to the immediate requirements of the surf, or adopt actions organized through a predetermined strategy. Examples of these include paddling out to the break by using a rip current to save energy or paddling to the middle of the peak to ensure a longer ride. In terms of strategy, proficient surfers are students of weather. They research tides and wind to determine the best days and times to surf their favorite breaks.

Surfing is by no means an isolated exception to the GCS, whereby rules, tactics, and strategies of play are legitimate decisions made by participants. The same argument could be conceivable for dancers, gymnasts, swimmers, hikers, cyclists, skaters, skiers, and other nonteam sports or recreational activities. The point is rules, tactics, and strategies of play are an important progression beyond mere skill execution as they require a conscious interaction with others and the environment in which they occur.

Movement Competencies

The role of developing fundamental movement skills (FMS) in youth has been well documented in the literature. Fundamental motor skills are related to physical activity (Fisher et al., 2005; Okely, Booth, & Patterson, 2001b; Saakslahi et al., 1999; Williams et al., 2008), and these fundamental movement skills are likewise related to physical fitness (Barnett, Van Beurden, Morgan, Brooks, & Beard, 2008; Haga, 2008; Okely, Booth, & Patterson, 2001a).

However, most studies in which the role of FMS has been examined have been limited to able-bodied students, land-based activities, and the role they play in providing access to popular sport participation. Most attempts to rationalize these skills into a singular resource or testing battery have met controversy in the physical literacy context because they fail to capture the broader physical literacy components of moving for play, enjoyment, recreation, health, or fitness. Nonetheless, although relying on traditional notions of FMS may limit a full understanding of physical literacy, the evidence provided toward understanding what it takes to lead a healthy and active life is substantial. In a review of the associated health benefits of developing fundamental movement skills in children and adolescents, Lubans, Morgan, Cliff, Barnett, and Okely (2010) determined that teaching children to become competent and confident performers of FMS may lead to a greater willingness to participate

in physical activities that may also provide opportunities to improve fitness levels and reduce the risk of unhealthy weight gain. Specifically, it is important that such skills are taught during the primary school years as children are at an optimal age in terms of motor learning and motor skill proficiency tracks through childhood.

To recognize this evidence, all of the traditional components of FMS (i.e., locomotor, stability, and object manipulation) have been included in this model. However, unlike traditional understandings of FMS, here the land- and water-based skills have been segregated (air-based skills such as hang gliding or skydiving could have also been included, but activities of this nature are not commonplace in school-based education). In addition to segregating the environment in which the movement skills are executed, “object locomotor” skills have been added.

Object locomotor skills facilitate locomotion when the human body manipulates a secondary source of movement other than the body itself. More often than not, these skills require the participant to combine a range of traditional movement skills (i.e., locomotor, stability, manipulative) to complete them successfully. For example, skiing, skating, cycling, paddling, rowing, or wheelchairs would constitute object locomotion. Including these elements may go some way to providing a solid foundation on which to build a new role of movement skill and competence in a physical literacy model.

To dispel the stigma attached to FMS in physical literacy, the term *movement competencies* has been adopted from the physical literacy literature to be used in the context of this taxonomy. Whitehead (2010) reframed the building block of FMS as a “bank of movement competencies” (p. 53). In other words, the more skills individuals have in their bank, the more they will be able to respond to situations in a way that is automatic and meaningful to them. These movement competencies have been referred to as one’s vocabulary and relate the process of becoming fluent in such action to the Piagetian notion of assimilation and accommodation (Whitehead, 2010).

Just as Piaget moves away from the sensing body by the prioritization of abstract thought in his formal operations stage, movement competencies may not simply infer directionality (e.g., stacking) and banking (e.g., filling) metaphors. The focus moves toward progressive complexity, and there is an inferred departure from “the realm of sheer kinetic” (Sheets-Johnstone, 1999, p. 136) within movement competencies.

Put simply, movement competencies allow humans to engage in meaningful physical activity within their physiological capability. Unlike previous understandings of movement in physical literacy, they recognize that most people throughout their life course will be inhibited through injury or incapacity to perform certain human movements, and therefore, it is redundant to subscribe to a deficit model when assessing them. They also recognize proficiency or artistry in certain movements linked to popular sport. It is not by any means an exhaustive capacity to be physically literate.

Table 6 shows how the components of movement competencies can be categorized for deeper understanding and planning. Each component contains examples of skills that may be classified as a movement competency in that setting.

Table 3
Movement Competency Classifications

Movement competencies	
Land-based	Water-based
1. Locomotor (e.g., walking, running, skipping, jumping, galloping)	1. Locomotor (e.g., flutter kicking, crawling, gliding, diving,)
2. Stability (e.g., balancing, landing, bending, twisting)	2. Stability (e.g., floating, treading water, tumble turning)
3. Manipulative (e.g., catching, striking, kicking, throwing)	3. Manipulative (e.g., using fins or snorkel, throwing in water, towing in water)
4. Object Locomotor (e.g., skating, skiing, cycling, wheel-chairing)	4. Object Locomotor (e.g., paddling, rowing, waterskiing, wakeboarding)

SOLO Levels of the Core Elements of Physical Literacy

Table 4 shows each of the core elements of physical literacy articulated in terms of their metacognitive SOLO progressions. For the reasons stated earlier, and for meaningful application in school settings, the manifestations and SOLO description of social development through movement are described as observed learning behaviors only. These criteria can be applied in any context of physical activity participation, but special mention is made to PE, school

sport, co- and extracurricular activities, recess and lunch breaks, and community events.

It is also prudent that any continuum of learning associated with physical literacy include a method of observing legitimate manifestations of personal responsibility toward health-promoting movement and not lay causality purely on social factors. At one end, the continuum must capture the state of when competence, autonomy, and relatedness are being satisfied and personal motivation toward health-promoting movement occurs. Conversely, it should identify when elements of competence, autonomy, and relatedness are absent and include points of intervention to move students along the continuum.

The SOLO descriptions of motivation and behavioral skills of movement have been described as observed learning behaviors only. As previously mentioned, these criteria can be applied in any context of physical activity participation, but as with personal and social attributes of movement, special mention is made to PE, school sport, co- and extracurricular activities, recess and lunch breaks, and community events.

The metacognitive SOLO rubric for understanding a student's progression in rules, tactics, and strategies of movement is also contained within the Rubric of Observed Learning in Physical Literacy (see Table 4). This rubric can be modified to accommodate any of the games classifications (Bunker & Thorpe, 1982) or activities that sit beyond the GCS that are argued for in this paper. Furthermore, unlike movement competencies, understanding of these concepts may manifest in several roles students adopt in their physical activity experiences. Examples and support for this notion of diverse student participation may be derived from the work of Siedentop (1994) with sport education. Students can and should conceivably be able to demonstrate their knowledge, skills, and understanding of rules, tactics, and strategies of play by adopting roles as player, coach, manager, or official. For this reason, the rubric for this core element was written broadly to provide a general structure for each aspect of play regardless of context or role. Existing assessment instruments of rule, tactical, and strategic understanding will need revision to be used within the physical literacy context described in this paper.

Finally, Table 4 shows a metacognitive SOLO rubric for understanding a student's progression in movement competencies. There are numerous assessment protocols that currently exist for understanding movement skill in youth and adults, and they provide valuable insight into the movement skill development of a population. However, in future protocols, researchers should consider the challenges set by this article in establishing movement competencies as legitimate manifestations of psychomotor development.

Applying a Rubric of Observed Learning in Physical Literacy

In this article, I explained the use of an observed physical literacy model as a metacognitive framework for an authentically student-centered approach to learning. The rubric in Table 4 exemplifies an integrated core element classification system that can be used to observe student behavior to infer cognitive, affective, and psychomotor achievement.

The development of a rubric of observed learning in physical literacy based on the taxonomy described within this article should enable educationalists, practitioners, and teachers to begin the informed development of assessment items to be used in the assessment and reporting of physical literacy. These instruments should be used to determine the progress students make based on varied starting points in any given physical learning context over time.

In physical literacy, as with any other concept in education, there needs to be a shift from an overreliance on simply providing “success” experiences and judging against nebulous “standards” to assessing “growth over time” (Masters, 2013, pp. 1–3). The power of applying this rubric to a learning continuum or reporting engine of physical literacy is to direct the discussion and thinking of teachers, students, and parents to knowing about what students think, do, and feel. Once this becomes the dominant learning discussion among these key stakeholders in learning, they may then focus their efforts in making students aware at the start of a physical experience what success is expected to look like (based on appropriate level of challenge) and then engaging them in the challenge to achieve that success (Hattie & Yates, 2013).

Table 4*A Rubric of Observed Learning in Physical Literacy*

Unistructural	Multistructural	Relational	Extended abstract
Personal and Social Attributes of Movement: Contexts may include physical education and other subject areas, school sport, co- and extracurricular activities, recess and lunch breaks, and community events.			
I am able to control my own behavior so I don't interfere with others. I do this without prompting and constant supervision.	I not only show respect for others, but I am also willing to play and move with others. I accept challenges, practice movement skills, and train for fitness/health with my peers.	...and I am able to work without supervision. I can identify my own movement needs and the relationship between my movement needs and those of my team/peers (i.e., strengths and weaknesses)... ...and I am able to extend my sense of responsibility to others by cooperating, giving support, showing empathy, or showing the inner strength to deal with adversity...	...and/or I demonstrate effective and compassionate leadership of my team/peers during physical activities... ...and/or I can see how I can adopt my social learning experiences through movement beyond my participation in physical activity to broader life lessons.
Motivation and Behavioral Skills of Movement: Contexts may include physical education, school sport, co- and extracurricular activities, recess and lunch breaks, and community events.			
I can move in ways that will improve my health or skill if I am prompted, if I am reminded, or if they are modeled.	I can move in ways that will improve my health or skill because I am self-motivated to improve a specific aspect of my physical self using different strategies (e.g., cardiorespiratory fitness, strength, endurance, speed, agility, dribbling, tackling, shooting).	I can move in ways that will improve my health AND skill because I understand the relationship between health and skill and am self-motivated to improve many aspects of my physical self...	...and I can evaluate the effectiveness of my movement in improving my health and skill... ...and/or I can help others to make moves to improve their health and skill... ...and/or I can create new movements for improving health and skill... ...and/or I can see how I can adopt my movement decisions for health and skill beyond my participation in physical activity.

Table 4 (cont.)

Rules, Tactics, and Strategies of Movement: Contexts may include physical education, school sport, co- and extracurricular activities, and recess and lunch breaks.

I can demonstrate that I understand the rules of play/movement and the need for rules when others set them in similar movement contexts.	I can demonstrate that I understand the rules of play/movement and the need for rules that others set in many movement contexts... ...and I can participate within the confines of rules in different movement contexts.	...and I demonstrate different tactical decisions to adapt to changing rules/circumstances in different movement contexts... ...and I demonstrate a capacity to develop basic strategy for different movement contexts...	...and I can evaluate the effect different rules, tactics, or strategy have in any given movement context... ...and/or I can create new strategies, tactics, and rules for improving play/movement... ...and/or I demonstrate how strategy, tactics, and rules of play/movement should be adopted in contexts beyond participation in physical activity.
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Movement Competencies: Contexts may include physical education, school sport, co- and extracurricular activities, and recess and lunch breaks.

I can complete that movement skill if I am assisted, if I am imitating, or if others model the movement.	I can complete that movement skill unassisted or by following instructions independently.	...and I can combine it with other movement skills to perform successful movement sequences with few errors...	...and I can appraise my own movement competence with this skill as it varies... ...and/or I can assist others to learn this movement skill... ...and/or I can create new adaptations to these skills to make them more effective in different contexts... ... and/or I can apply these skills in contexts for which they were not intended.
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Furthermore, the dangers and overreliance on either surface or deep learning is circumvented through use of this rubric of observed learning in physical literacy. As supported by Hattie (2009), application of this rubric to think about assessment instrument design should shift learning focus toward a balance of surface and deep learning. When teachers and students can engage with and balance surface and deep understanding of physical literacy, the student can begin to construct notions of what it means to be a physically literate person. Biggs and Collis (1982) discussed these notions of surface, deep, and constructed (conceptual) understanding when they initially developed their SOLO taxonomy. The critical application aspect of this rubric for teacher consideration is that students need to have surface knowledge, skills, or behavior to reach deep knowledge, skills, or behavior of any core physical literacy domains discussed in this article. They need to have surface knowledge, skills, or behavior and deep knowledge, skills, or behavior before deep understanding of what it means to be physically literate can occur. According to Hattie (2009), when students can regulate or use metacognition (apply knowledge and skillfulness) to their learning, they eventually become their own teachers.

The application of the observed learning in physical literacy rubric in initial assessment design should also be aimed at promoting teacher dialogue and student awareness of physical literacy. As argued by Dudley, Okely, Pearson, and Cotton (2011), many of the outcomes articulated in the PE curricula of developed nations and by the United Nations need to be tackled in cross-curricula and holistic school interventions if they are to be achieved. In much the same way that literacy and numeracy are often addressed in schools across many subjects and learning experiences, the rubric of observed physical literacy outlined in this article indicates areas within and beyond the formal curricula in which progression may be judged. For this reason, it can be used to inform the planning for and active teaching of physical literacy in a way that is developmentally appropriate and sufficiently challenging for students across their school learning experiences.

Most important, it is envisaged that as students and teachers become familiar with the rubric of observed learning in physical literacy, it will lead to the development of “road maps” for the students in plotting their own achievements, strengths, and weaknesses in their own manifestations of physical literacy. Each student’s road map will vary, but the application of the observed physical literacy

rubric in schools could be used as a visual tool to show students their surface, deep, and conceptual understandings of physical literacy and in turn become an instrument used to encourage students to lead active and purposeful physical lives.

Empirical evaluation of its effect on student achievement across the three learning domains and further insight from teachers about ways in which this rubric may be applied as a tool to empower their understanding of student physical literacy is now needed.

Each of the core elements in this observed physical literacy model are derived from dominant PE pedagogy, behavior motivation, and metacognitive models. The importance of integrating each of the pedagogical and behavior motivation models in a nonhierarchical fashion while using the SOLO taxonomy as the hierarchical scaffold is noteworthy. Many teaching programs in developed nations already demonstrate particular bias toward one or two pedagogical models at the expense of others in their core and noncore curricula design. For example, games-based instruction permeates from North American, United Kingdom, and Australian curricula, whereas skills-based and behavioral motivation models are commonplace in many Asian nations (Dyson, Griffin, & Hastie, 2012). The placing each model in an integrated fashion, but within a common metacognitive schema, should allow for inclusive conversations by schools and teachers who wish to develop physical literacy beyond merely a PE context. Empirical investigation, however, is needed to ascertain the depth of knowledge teachers require in the fields of metacognition, behavior motivation, and pedagogy to make the application of an observed physical literacy model efficacious in teaching practice.

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TEACHER EDUCATION

Effect of Physical Education Teachers' Computer Literacy on Technology Use in Physical Education

Rolf Kretschmann

Abstract

Teachers' computer literacy has been identified as a factor that determines their technology use in class. The aim of this study was to investigate the relationship between physical education (PE) teachers' computer literacy and their technology use in PE. The study group consisted of 57 high school level in-service PE teachers. A survey was used to assess the PE teachers' computer literacy and instructional technology and media use in PE. Quantitative statistical procedures were performed to analyze the data. The majority of the PE teachers did not often use technology in PE. PE teachers' computer literacy had an effect on their technology use in PE. PE teachers' use of information and communication technologies (ICTs) such as laptops, Internet, and digital cameras showed statistically significant differences in their computer literacy levels (low, average, and high). The surveyed PE teachers tended to not use technology in PE. However, the higher their computer literacy level was, the more likely they were to include technology in PE.

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Technology has become normal and even ubiquitous in everyday life (Horst, 2012). The tech-savvy so-called digital natives (Bennett, Maton, & Kervin, 2008; Prensky, 2001), also known as the Net generation, “naturally” include diverse technologies in their daily routines. The society-wide technology enhancement also includes educational settings such as school. For school-aged children and adolescents, this means they are accompanied by technology not only in their leisure time, but also in their everyday life at school (Nemcek, 2013).

Technology as an instructional method has conquered school classrooms in the meantime (Calvani, 2009). Technology uses in schools have certainly been increased over the past decade (Wastiau et al., 2013). Among the school subjects, physical education (PE) and physical education teacher education (PETE) have been infused with technology as well, at least within the academic discussion and debate (Kretschmann, 2010; Leight & Nichols, 2012; Mohnsen, 2012; National Association for Sport and Physical Education, 2009).

With regard to research findings in the field of technology and PE, the empirical evidence is limited and few empirical studies are available (Kretschmann, 2010). Especially, the PE teachers’ perspective has not been in the center of empirical studies so far. The majority of the studies have been focused on PETE students’ information and communication technology (ICT) competency and skills (Adamakis & Zounhia, 2013; Z. Goktas, 2012; M. Yaman, 2007a, 2007b). Not much evidence can be found on in-service PE teachers (Kretschmann, 2012; Levent Ince, Goodway, Ward, & Lee, 2006; Tearle & Golder, 2008; Woods, Goc Karp, Miao, & Perlman, 2008; M. Yaman, 2007a). Although some researchers have reported PE teachers’ computer literacy and technology use in PE independently (Thomas & Stratton, 2006; Woods et al., 2008), researchers in previous studies did not examine the direct effect of PE teachers’ computer literacy on their technology use in PE.

The significance of a supposed direct relationship between PE teachers’ computer literacy and their technology use in PE derives from an evidence-based rationale: The effect of teachers’ computer literacy on computer use in the classroom has been researched in depth and in manifold studies (Afshari, Abu Bakar, Luan, Abu Samah, & Say Fooi, 2009; Kreijns, Vermeulen, Kirschner, Van Buuren, & Van Acker, 2013). Lack of (PE) teachers’ ICT skills has even been identified as a barrier for ICT implementation in the classroom (Buabeng-Andoh, 2012; Tearle & Golder, 2008). Furthermore, PE

may be special among the other school subjects in regard to the exclusive human movement and physical activity content and methods (Newell, 2011; Tinning, 2011) and may therefore not come to mind at first sight, being judged as a nontechnology-related subject (Kretschmann, 2010; Mohnsen, 1997).

Hence, the aim of this study was to investigate the effect of PE teachers' computer literacy on their technology use in PE. PE teachers' computer literacy levels should be determined. In addition, the frequency of PE teachers' technology use in PE should be documented as well.

Method

The study group consisted of 57 high school level PE teachers ($M_{\text{age}} = 48.84 \text{ years} \pm 1.39$). Among the PE teachers, 26 were male (45.6%) and 31 were female (54.4%). Initially, 120 PE teachers were asked to participate in the study. The PE teachers who turned down the request gave nonparticipating reasons such as lack of time, disinterest in the topic, or disinterest in participating in research in general.

A questionnaire survey was used that contained a section for personal data (age, gender), a section for computer literacy, and a section for instructional technology (old and new media) use in PE. The computer literacy section included 10 items, which average scores were pooled into a subscale ($M = 2.88 \pm 1.02$). The items were on a 5-point Likert-type scale (5 = *very good*, 1 = *very poor*) and included aspects according to computer hardware and software functionalities. Reliability analysis of this subscale returned excellent values (Cronbach's $\alpha = .90$). In the instructional technology section, the PE teachers were asked about the frequency of including instructional technology and media in PE using a 5-point Likert-type scale (5 = *very often*, 1 = *never*) as well.

For the analysis of the collected data, statistical procedures such as correlations, *t* test, Mann–Whitney U test, one-way analysis of variance (ANOVA), and Fisher's LSD post hoc test were conducted. For all statistical procedures, alpha was set at .05. The statistical procedures were performed using the software IBM SPSS Statistics (Version 21) for Mac OS.

Results

Among the 57 PE teachers, 10 (17.55%) were assessed low-level computer literacy, 26 were on an average computer literacy

level (45.61%), and 21 were grouped into a high level of computer literacy (36.84%). There were no significant differences in the PE teachers' computer literacy regarding gender (t test, $p > .05$).

PE teachers' age and computer literacy were significantly correlated (Spearman's rho, $r = .38$, $p < .01$), with a moderate positive relationship. Based on the study groups' average age, this relationship was expected as the emergence of newer ICTs took place after a fair amount of the PE teachers' school and college level education.

The PE teachers' instructional technology-use data clearly highlighted the PE teachers' tendency to not include technology in PE. However, there were two exceptions, namely, stereo systems and images. The PE teachers used them more frequently than other media. Noteworthy, textbooks may have not been regarded as mandatory for PE, as they remained on the same use level as other media and technology. ICT (PC, laptop, and Internet) clearly seemed to be disregarded in terms of integrating in PE classes. Nevertheless, video appeared to have a more prominent standing in regard of usage rate. The complete frequencies of the PE teachers' technology use in PE are shown in Figure 1.

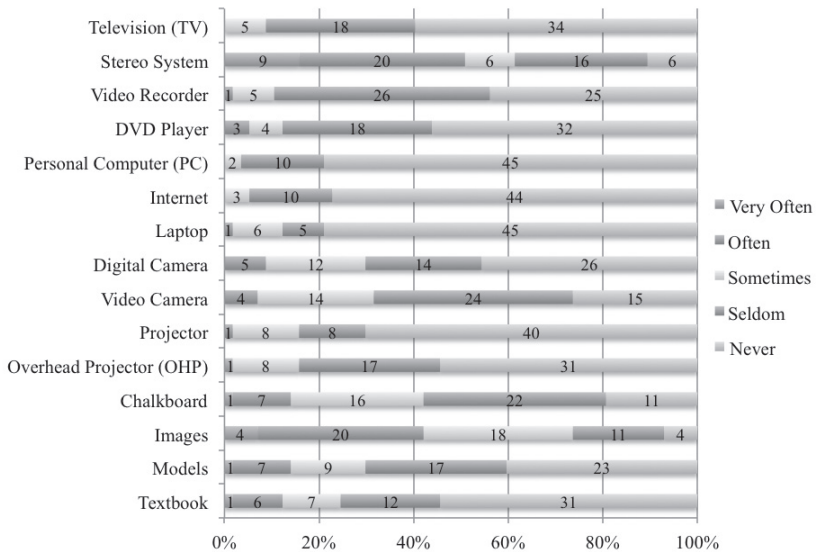


Figure 1. Instructional technology and media use in PE.

In regard to gender, only two of the 15 instructional media showed a statistically significant difference (Mann–Whitney U test, $p < .05$). Stereo system use was significantly different ($U = 100.00$, $z = -5.04$, $p < .001$), as female PE teachers ($M = 3.97 \pm .17$) used stereo systems more frequently than did male PE teachers ($M = 2.23 \pm .17$). Moreover, male PE teachers ($M = 2.00 \pm .19$) used overhead projectors significantly ($U = 241.00$, $z = -2.88$, $p = .004$) more frequently than did female PE teachers ($M = 1.35 \pm .11$).

Among the 15 instructional media, only three (Internet, laptop, and digital camera) showed a statistically significant difference ($p < .05$) according to computer literacy level of the PE teachers. The complete ANOVA results are shown in Table 1.

Table 1
Computer Literacy and Instructional Technology and Media Use in PE

Instructional media	Computer Literacy			<i>F</i>	η^2
	Low	Average	High		
Television (TV)	1.48 _a (.60)	1.38 _a (.57)	1.80 _a (.92)	1.472	.03
Stereo System	3.19 _a (0.13)	3.19 _a (0.11)	3.10 _a (.41)	.020	.00
Video Recorder	1.71 _a (.78)	1.69 _a (.68)	1.60 _a (.70)	.088	.00
DVD Player	1.76 _a (.94)	1.38 _a (.64)	1.90 _a (.99)	1.938	.05
Personal Computer (PC)	1.29 _a (.56)	1.15 _a (.46)	1.40 _a (.52)	.942	.01
Internet	1.08 _a (.27)	1.33 _{ab} (.58)	1.70 _b (.82)	5.351**	.06
Laptop	1.14 _a (.48)	1.27 _a (.60)	2.00 _b (1.15)	5.566**	.11
Digital Camera	1.57 _a (.93)	1.92 _a (.89)	2.70 _b (1.16)	4.747*	.18
Video Camera	2.05 _a (.86)	2.04 _a (.82)	2.50 _a (1.08)	1.099	.04
Projector	1.38 _a (.74)	1.35 _a (.69)	2.00 _a (1.05)	2.774	.07

Table 1 (cont.)

Instructional media	Computer Literacy			<i>F</i>	η^2
	Low	Average	High		
Overhead	1.43 _a	1.73 _a	1.90 _a	1.258	.04
Projector	(.68)	(.78)	(1.29)		
Chalkboard	2.00 _a	2.58 _a	2.70 _a	2.710	.10
	(.89)	(.81)	(1.12)		
Images	2.90 _a	3.19 _a	3.60 _a	1.544	.07
	(1.04)	(.98)	(1.17)		
Models	1.62 _a	2.38 _a	2.10 _a	2.977	.14
	(.92)	(1.10)	(1.29)		
Textbook	1.62 _a	1.77 _a	2.50 _a	2.323	.11
	(.86)	(1.07)	(1.21)		

Note. Standard deviations appear in parentheses below means. Means with different subscripts within rows are significantly different at the $p < .05$ based on Fisher's LSD post hoc paired comparisons.

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

For Internet use, there was a statistically significant difference between low-level computer literacy PE teachers and high-level computer literacy PE teachers as determined by one-way ANOVA, $F(2, 54) = 5.351, p = .008$. A Fisher's LSD post hoc test revealed that PE teachers showing high computer literacy ($M = 1.70 \pm .82, p = .002$) used the Internet in PE statistically significantly more frequently than did PE teachers showing low computer literacy ($M = 1.08 \pm .27$). There were no statistically significant differences between low-level computer literacy PE teachers and high-level computer literacy PE teachers ($p = .072$) and no statistically significant differences between high-level computer literacy PE teachers and high-level computer literacy PE teachers ($p = .099$).

Regarding laptop use in PE, there was a statistically significant difference between low-level computer literacy PE teachers and high-level computer literacy PE teachers and between high-level computer literacy PE teachers and high-level computer literacy PE teachers as determined by one-way ANOVA, $F(2, 54) = 5.566, p = .006$. A Fisher's LSD post hoc test revealed that PE teachers showing high computer literacy ($M = 2.00 \pm 1.15, p = .002$) used laptops in PE statistically significantly more frequently than did PE teachers showing low computer literacy ($M = 1.14 \pm .48$) and that PE teach-

ers showing high computer literacy ($M = 2.00 \pm 1.15, p = .006$) used laptops in PE statistically significantly more frequently than did PE teachers showing average computer literacy ($M = 1.27 \pm .60$). There were no statistically significant differences between low-level computer literacy PE teachers and high-level computer literacy PE teachers ($p = .535$).

Concerning digital camera use in PE, there was a statistically significant difference between low-level computer literacy PE teachers and high-level computer literacy PE teachers and between high-level computer literacy PE teachers and high-level computer literacy PE teachers as determined by one-way ANOVA, $F(2, 54) = 4.747, p = .013$. A Fisher's LSD post hoc test revealed that PE teachers showing high computer literacy ($M = 2.70 \pm 1.16, p = .003$) used digital cameras in PE statistically significantly more frequently than did PE teachers showing low computer literacy ($M = 1.57 \pm .93$) and PE teachers showing average computer literacy ($M = 1.92 \pm .89, p = .033$). There were no statistically significant differences between low-level computer literacy PE teachers and average-level computer literacy PE teachers ($p = .214$).

Discussion

With regard to the findings of Woods et al. (2008), C. Yaman (2008), and M. Yaman (2007b), the data suggest that PE teachers do not show worse or better computer literacy than other school subject teachers (Albirini, 2006; Al-Zaidiyeen, Mei, & Fook, 2010; Y. Goktas, Yildirim, & Yildirim, 2009; Kibirige, 2011; Wastiau et al., 2013). The PE teachers appear to be neither tech savvy nor total ICT beginners. This opposes an understanding of PE as a contradicting entity to sedentary media-heavy leisure and educational settings. Within this PE philosophy, the human body is regarded as only relevant media, and PE teachers therefore may not need to have computer literacy as they are not intended to integrate technology (Kretschmann, 2010, 2012). Nevertheless, the PE teachers, being "digital immigrants" (Prensky, 2001), show sufficient computer literacy levels regardless of whether such a media-neglecting PE philosophy may be assumed. Another common belief among PE teachers that may cause less technology use is that integrating technology leads to a reduction in movement time (Mears, 2009a; Perlman, Forrest, & Pearson, 2012).

The sample covered mostly established PE teachers who had been in service for several years. Therefore, age appears to be a fac-

tor as the majority of the PE teachers may not have been exposed to technology as an instructional method during their school and college level education (Ayers & Housner, 2008; Hetland & Strand, 2010). Older PE teachers may be stigmatized as digital immigrants, whereas younger teachers are most certainly digital natives (Guo, Dobson, & Petrina, 2008). Following this thought, future generations of PE teachers are expected to show higher levels of ICT competency as well as prospective teachers of other school subjects (Mohnsen, 1997). On the other hand, there may be an alternative approach that deliberately promotes PE as a school subject that gives students, who are constantly exposed to technology, a media-absent break that they may experience as a relief (Acquaviva, Beaudet, & Maina, 2013). As the PE teachers' PE philosophy and ideologies were not surveyed, the relationship between the PE teachers' conceptual understanding of PE and technology use in PE remains unclear.

Despite increased interest of PE teachers in technology stated in previous studies (Gibbone, Rukavina, & Silverman, 2010; Perrotta, 2013; Thomas & Stratton, 2006), the PE teachers in this study tended to not include technology in PE. These results mirror the findings by Kretschmann (2012) that reveal a negative and skeptical attitude to integrating technology in PE. Especially, ICT (PC, laptop, and Internet) is hardly used in PE. A decent level of computer literacy and an (assumed) interest in instructional technology seems not to lead to a trend in integrating more technology (and instructional media in general) into PE. Compared with a PE teacher sample in Gibbone et al. (2010) who had positive attitudes toward technology use in PE, the sample in this study tended to have negative attitudes toward integrating technology in PE.

Statistically significant gender differences were found in only two of the 15 assessed instructional media. This result confirmed other findings that indicate there is no major gender difference in this subject area (Ilomaki, 2011; Vekiri, 2013).

The gender differences in stereo system use may have been caused by a content preference bias of male and female PE teachers (Green, 2008). It may be assumed that female PE teachers tend to cover more dance and rhythmic gymnastics activities in PE than do male PE teachers (Hill & Cleven, 2005). As these activities are usually accompanied by music, female teachers may use stereo systems more frequently. In addition, male teachers may tend to avoid such activities as they may feel uncomfortable with such content (Rustad, 2012).

The gender differences in the use of overhead projectors in PE may have been caused in this study sample because more male PE teachers also taught a natural science subject compared with the female PE teachers. In regard to everyday school practices, it may be assumed that natural science school subject teachers tend to use more visual instructional methods such as overhead projectors than do teachers of other school subjects. A common and established teaching method in a particular subject may therefore be more likely to be used in other subjects taught by the same teacher. However, this is mere speculation and not based on empirical evidence.

In sum, it is not much of a surprise that computer literacy levels in PE teachers influence their actual (digital) instructional technology use, whereas there is no effect on traditional (analogue) instructional media. Common sense may be confirmed by the findings in this study, reporting that the higher the level of PE teachers' computer literacy is, the more likely they will also use instructional technology such as laptops, Internet, and digital cameras in PE.

Statistically significant differences were found between PE teachers' computer literacy levels in regard to instructional technology and media use (ANOVA accompanied by LSD post hoc tests) in only three of 15 instructional media, and this suggests that computer literacy levels do not influence traditional instructional media use, but (portable) ICT use and digital camera use. The statistically nonsignificant varying results for PCs compared with the statistically significant results for laptops may be explained by the laptop being portable. PCs may not be regarded as useful for PE as they are restricted to a single location. In contrast, laptops are portable and can serve in multiple occasions and locations within the PE setting (Juniu, 2011; Kretschmann, 2010; Mohnsen, 2005).

The use of Internet for and in PE has been well documented in the literature (Elliott, Stanec, McCollum, & Stanley, 2007; Leight, 2012; Neal, 2000). The effect of PE teachers' computer literacy on Internet usage rate in and for PE also derives theoretically from the direct connection of Internet and computers/laptops. There is simply no Internet connection possible without a device such as a computer/laptop or handheld with an operating system installed. Moreover, without the necessary computer literacy to use and operate a computer or computer-like device, there will be no access to the Internet. Thus, there was an expected relationship of computer literacy and Internet use based on this explanatory framework.

The influence of the PE teachers' computer literacy level on digital camera use in PE is based on its nature of a human-machine interaction interface and digital storage. The characteristics of these digital cameras are well placed in a computer literacy context as using the operating system on a digital camera may be similar to using an operating system on a computer. Furthermore, several pedagogical scenarios of integrating digital cameras in PE have been provided in the literature (Mikat & Anderson, 2005; Ryan, Marzilli, & Martindale, 2001). As functionalities of digital cameras and video cameras overlap in terms of video capturing, the survey did not include such a distinction. Therefore, it cannot be inferred to which amount the PE teachers used digital cameras for video recordings. In addition, the overlap with smartphone video recording functionalities (Cummiskey, 2011) was not covered in this study.

Only high school level PE teachers participated in this study, and this limits the results. Technology use and related PE philosophies are most likely to be different in school forms and grade levels (Gibbone et al., 2010; Woods et al., 2008). Primary school PE has different structures and principles than secondary school PE (Graham, Holt/Hale, & Parker, 2007), which leads to different technology applications and rationales (LaMaster, Barnes-Wallace, & O'Connor Creeden, 2002; Mitchell, 2001; Sun, 2012).

As mentioned before, it is likely that this study group formed a PE teacher sample who had relatively negative attitudes toward technology use in PE. A PE teacher sample with positive attitudes to PE might lead to different results (Gibbone et al., 2010; Z. Goktas, 2012). Therefore, there might be a study groups' negative bias according to technology use in PE.

The diverse other factors that influence technology use of teachers were not covered in this study. For instance, access to adequate levels of ICT infrastructure cannot be assumed universal among teachers (Burnip, 2006). Especially for PE teachers, it may be difficult to access and transport technology that may be available in the regular classroom to PE facilities. For instance, the mere lack of a power outlet may deem certain technology uses as impossible.

Other factors include parent and community support, availability of vision and plan about contribution of ICT on a particular school's education, availability of time (to experiment, reflect, and interact), available support to computer-using teachers in the workplace, school culture, computer attributes, level and quality of training for teachers and school principals, attitudes to computer,

and effective training program (Afshari et al., 2009; Perrotta, 2013; Prestridge, 2012). This high amount of influencing factors on teachers' technology use in class explains the low effect sizes ($\eta^2 = .06 - .18$) of the ANOVA. However, the enormous number of confounders and related factors clearly emphasizes the complexity beyond the technology use by teachers.

Overall, technology use in PE may not be as numerous in reality opposed to the numerous literature finds (Kretschmann, 2010) and seems to be far away from mandatory or ubiquitous. Nevertheless, pressure on PE teachers to integrate technology may increase as the digital native PE students will probably demand the same technologies that ubiquitously surround them in their daily routines for the school classroom and PE facilities as well, which can already be stated for the higher education classroom setting at least (Kinash, Wood, & Knight, 2013). As the instructional technology will likely continue developing, applications for PE will likely do so as well. PE teachers will therefore have plenty of pedagogical uses of technology in PE to experiment on and chances to work on their computer and ICT literacy, too (Woods et al., 2008).

Conclusions

The surveyed high school level in-service PE teachers tended to not use technology and general instructional media in PE. In conclusion, the PE teachers' computer literacy influenced their technology use in PE for (portable) ICTs (laptop, Internet, and digital camera) on a statistically significant level. The higher the PE teachers' computer literacy level was, the more likely they were to integrate the respective technologies in PE.

Future research on the relation between computer literacy and technology use in PE may be focused more on ICT assets such as handhelds, smartphones, and tablets (Cummiskey, 2011; Monsma, 2003; Nye, 2010), podcasts (Nordmeyer & Castelli, 2009; Shumack & Reilly, 2011), wikis (Mears, 2009b), virtual PE (Rhea, 2011), and blended learning scenarios (Vernadakis, Giannousi, & Tsitskari, 2012). The factors influencing teachers' technology use in classes (Afshari et al., 2009) should be integrated into comprehensive study designs to shed more light on their relationships in the PE setting. Practical implications for PETE and PE teachers' continuing education arise as far as that successful programs for the development of computer and ICT literacy should continue to emerge (Bechtel, 2010; Leight & Nichols, 2012), eventually being scientifically evaluated in the process.

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TEACHER EDUCATION

The Effects of Field Experience on Delivery of Feedback

Adolfo R. Ramos, Kerry Esslinger, Elizabeth Pyle

Abstract

The purpose of this study was to examine pre-service teachers' (PTs) ability to deliver feedback, which has been used as a process variable in identifying teacher-effectiveness and an established NASPE standard for beginning teachers. These questions guided the study:

- 1. Will overall feedback interactions delivered by PTs reach 45 per video?*
- 2. What is the nature of the feedback interactions provided by physical education pre-service teachers?*

The participants in this study were nine college-aged PTs enrolled in a required Elementary Physical Education Practicum and Methods course taught twice per week to students in Grades 3 to 6 and videotaped four times. Analysis of the videotapes was performed using the Studiocode analysis program. PTs surpassed the 45 feedback interactions by delivering an average of 56 feedback interactions per lesson. Delivery of corrective feedback was reduced from 34.78 interactions in pretest to 32 interactions during posttest. Congruent feedback increased from pretest to posttest from 6.22 to 8.55 interactions, respectively. Individual interactions were reduced from pretest (39.55) to posttest (26.55), and small group interactions in-

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creased from pretest (17.55) to posttest (21.66). Analysis of videotapes should continue to be integrated during field experiences to augment PTs pedagogical skills. Future research should be focused on the effects of specific feedback protocols on PTs delivery of feedback during field experiences.

Physical education teacher education (PETE) programs enhance pre-service teachers' (PTs) preparation using field experiences (FEs), which provide students the opportunity to immerse themselves in a class environment as they interact with teachers and students (Napper-Owen, Marston, Volkinburg, Afeman, & Brewer, 2008). PTs benefit from observing and assisting a cooperating teacher and conducting teaching (Larson, 2005).

Through well-designed FEs, PETE program staff develop physical education teachers who demonstrate acceptable performance as suggested by the National Association for Sport and Physical Education (NASPE, 2009). Specifically, NASPE Standard 4.3 states that beginning teachers should be able to provide effective instructional feedback for skill acquisition, student learning, and motivation.

Feedback has been described as information learners receive about their performance (Rink, 2010). Providing individuals with feedback about their actions is one of the most important ways practitioners can influence the learning process (Schmidt & Wrisberg, 2000). Feedback can have informational (corrective) and motivational functions as it can provide learners with knowledge about the nature of the task as well as energize task interest and encourage continued effort and persistence (Lewthwaite & Wulf, 2010). Corrective feedback is focused on improving the students' performance (Pangrazi & Beighle, 2013, p. 160).

Feedback interactions can be either general or specific (Siedentop & Tannehill, 2001), congruent or incongruent. Congruent feedback is directly related to what the learners have been asked to focus on (Rink, 2010). According to Lee, Keh, and Magill (1993), the effectiveness of teacher feedback may vary according to the teacher's knowledge about the skill. Teachers with limited knowledge of the skill being taught may fail to recognize and correct students' errors (Siedentop & Tannehill, 2001).

Purpose

According to Siedentop and Tannehill (2001) in their descriptive research summary, in general, teachers provide feedback with rea-

sonable frequency, often as many as 30–60 events during a 30-min period. For purposes of this study, the target of feedback interactions by PTs was 45 per lesson, following the minimum requirements set for the methods course. Other researchers such as Magill (2010) and Schmidt (as cited in Pellet, Henschel-Pellett, & Harrison, 1994) have suggested that teachers should provide feedback that is specific, congruent to the task.

Researchers such as Fishman and Tobey (as cited in Lee et al., 1993) and Silverman (as cited in Lee et al., 1993) have also suggested in the literature that feedback is most often directed at individuals rather than groups. The primary purpose of the study, therefore, was to determine the impact of a methods course on the feedback interactions of physical education PTs. Specifically, the rate and nature of feedback the PTs provided was examined, as providing feedback that is specific (rather than general) and congruent is known to be most effective with children (Graham, 2008).

Research Questions

The PTs' ability to deliver feedback was examined in this study, which has been used as a process variable in identifying teacher-effectiveness (Lee et al., 1993; Gusthart, Kelly, & Rink, 1997) and is an established NASPE standard for beginning teachers to master. The following questions were used to guide the study:

1. Will overall feedback interactions delivered by PTs reach 45 per video?
2. What is the nature of the feedback interactions provided by physical education pre-service teachers?
3. What is the impact of an elementary physical education methods course on the nature of PTs' feedback interactions?

Method

Participants

The participants in this study were nine college-aged PTs enrolled in a required Elementary Physical Education Practicum and Methods course. During a 5-week period, the PTs taught twice per week at three local schools to students in Grades 3 to 6 as part of the course requirements. Each PT had approximately 12 to 15 students with whom to work during each lesson. The schools had classes of 45 min of assigned time.

Each participant was videotaped four times. They were videotaped once a week during the 5-week experience. No videos were recorded during the third week. PTs were required to observe their own videos, code, and reflect on each one after each lesson. Coding of videos took place in the Physical Education Pedagogy Lab. PTs coded their videos using Studicode software to analyze specific events such as activity time, instruction time, management time, wait time, and how often they provided feedback and the types (general, specific, or congruent).

Because PTs were assigned to three local area schools, a variety of units of study were taught, such as football, soccer, and volleyball. Classes were taught indoors, and schools had the appropriate amount of equipment for students to be actively involved.

Protocol

A random number from 1 to 9 was assigned to each participant, and his or her videos were analyzed in order. Participants' videos were given the number and the letter *A* or *B* to identify their two videos. The letter *A* was assigned to each PTs' first video (pretest) of the teaching experience, and the letter *B* was assigned to their last video (posttest) of the teaching experience. Videos and results were saved on a 1T My Book external hard drive. The first author, who has 3 years of experience working with Studicode, analyzed the videos. The analysis was performed in the first author's office. Both videos of each participant were analyzed the same day—one day for each participant.

To determine interrater reliability, the three investigators coded two randomly selected videos for the nature of feedback. On attaining a Cronbach's alpha of .916, the first author proceeded to code all 18 videos.

Apparatus

Analysis was performed using a code window created in the Studicode analysis program. The code window, designed by the primary investigator, was aligned with the purposes of the study. For purposes of this study, the amount of feedback given by PTs was observed during the instances of the video coded, by the investigator, as Activity Time.

Definition of Terms

The following terms were adapted from Graham, Holt/Hale, and Parker (2010); Rink (2010); and Schmidt and Wrisberg (2000):

Activity Time: Time spent moving as students perform activities consistent with the focus of the lesson.

Congruent Feedback: Refers to the relationship between the content of feedback, the focus of the task, and the cues the teacher gave for the task. Linked directly to student responses and used to identify key elements.

Corrective Feedback: Information on what to do or what not to do in future performances

General: Information that clarifies the intent of the performance.

Specific: Must be related to an aspect or a result of performance.

Motivational Feedback: Augmented feedback about an individual's progress toward goal achievement that energizes and directs the person's behavior.

Positive Feedback: Information regarding what is good about the performance.

Individual Feedback: Information provided directly to one student.

Group Feedback: Information provided to a small group of students.

Analysis

After each video was coded using Studiocode, the investigator pressed the Analysis button on the screen to obtain the results for each video. Data were then uploaded into an Excel spreadsheet using the specific variables for the study and then to SPSS 18.0 for analysis. A paired-samples *t* test was used to compare the pretest and posttest amount of interactions that PTs delivered.

Results and Discussion

Overall Feedback

The impact of a methods course on PTs' delivery of feedback was investigated in this study. Physical education encompasses a variety of activities and skills, factors affecting the delivery of feedback that must be considered in research. Simple and complex skills need different feedback, and teacher feedback may not be necessary for some skills (Lee et al., 1993).

The first research question of the study examined if the overall feedback interactions delivered by PTs reached 45 per video. The results for amount of corrective and motivational feedback provided by PTs to their students (Table 1) show that PTs delivered more corrective feedback (58.6%) than motivational feedback (40.9%). Overall, PTs' delivery of corrective feedback was slightly reduced from 34.78 interactions in pretest to 32 interactions during posttest. Results also show an increase in the amount of motivational feedback from 21.22 interactions during pretest to 25.88 interactions during posttest.

Table 1
Paired-Samples t Tests Analyses for Overall Feedback Interactions (n = 9)

Type of feedback	Pretest		Posttest		t value	
	M	SD	M	SD	t	p
Corrective	34.78	11.45	32.00	9.97	.932	.053*
Motivational	21.22	9.06	25.88	11.99	-.996	.736

* $p < .1$.

Overall Feedback Interactions

PTs overall performance on delivery of feedback surpassed that found by Siedentop and Tannehill (2001), whose descriptive research summary indicates that, in general, teachers provide feedback with reasonable frequency, often as many as 30–60 events during a 30-min period. In this study, PTs delivered an average of 56 feedback interactions per lesson (33 corrective and 23 motivational). These results met the overall number of interactions established at 45 feedback interactions per lesson.

Nature of Feedback Interactions

The second research question investigated the nature of the feedback interactions that PTs provided. The results for the nature of feedback interactions that PTs delivered are shown in Table 2. The highest mean amount of feedback was feedback to individuals (39.55) followed by general feedback (20.44). Conversely, the lowest mean amount was congruent feedback (6.22) followed by specif-

ic feedback (8.11). Posttest data indicate the highest mean amount of feedback was individual feedback (26.55) followed by feedback to groups (21.66). Alternatively, the lowest mean amount of posttest feedback was congruent feedback (8.55) followed by specific feedback (9.11).

The methods course had a significant impact on PTs' delivery of general feedback, but not specific, congruent, individual, or group feedback. PTs significantly ($\alpha = .1$) reduced their interactions of general feedback from 20.44 interactions in pretest to 14.33 interactions in posttest. Results also show that on average PTs had only 8.11 interactions of specific feedback during pretest and 19.11 interactions during posttest.

Overall, PTs delivered more feedback to students individually, averaging 33 interactions for both videos than group feedback, which averaged 19.5 interactions. However, the individual interactions were reduced from pretest (39.55) to posttest (26.55) and small group interactions increased from pretest (17.55) to posttest (21.66).

The methods course did not significantly impact PTs' delivery of some feedback. PTs struggled with delivery of congruent feedback, obtaining the lowest amount at 6.22 interactions. When receiving congruent feedback, students hear a consistent message, allowing them to recall and apply the cue (Graham et al., 2010). Though not significant, results indicate that PTs increased their delivery of congruent feedback from pretest to posttest as they delivered 6.22 and 8.55 interactions, respectively.

Table 2

Paired-Samples t Tests Analyses for Nature of Feedback Interactions (n = 9)

Type of feedback	Pretest		Posttest		t value	
	M	SD	M	SD	t	p
General	20.44	8.67	14.33	5.97	2.06	.073*
Specific	8.11	3.98	9.11	7.86	-.45	.417
Congruent	6.22	2.58	8.55	7.92	-.889	.138
Individual	39.55	12.16	26.55	11.37	1.60	.682
Group	17.55	11.73	21.66	12.56	-.62	.376

* $p < .1$.

The third research question examined the impact of the methods course on the nature of PTs' feedback interactions. The paired-samples *t* test analyses for the pre- and posttest data show that the reduction in corrective feedback was significant at $\alpha = .1$, whereas that for motivational feedback was not (see Table 1). A variety of factors may have contributed to the increase in motivational feedback from pretest to posttest. However, it could have been caused by PTs teaching mostly small-sided games during their last lessons of the FEs. PTs were asked to follow the skill themes approach (Graham et al., 2010), teaching fundamental movements at the beginning of their field experience and then combining them with other skills, used in more complex settings such as games.

The amount and nature of feedback that PTs delivered was evaluated in this study. The results obtained provide investigators with information needed to establish protocols for future video analyses to augment PTs development of delivery of feedback and other teaching behaviors. Ramos (2011) found that PTs felt strongly about using videotaping analysis to reflect on their teaching behaviors. PTs commented that videotape analysis allowed them to "evaluate management skills, "observe my positioning," and "observe students' behavior," among others. Similarly Pruzak, Dye, Graham, and Graser (2010) found that students felt they had received far more feedback than had they not analyzed their own lessons.

Implications for Future Research

The results from this research suggest that videotape analysis should continue to be integrated in PETE programs to enhance the development of PTs pedagogical skills, thus enabling PTs to observe the results of behavior on student work as well as evaluate dimensions of teaching (Rink, 2010). Furthermore, programs not currently using videotape analysis should consider implementing it.

One of the strengths of the current study was the use of videotape statistical analysis to obtain the results. Though data must be interpreted in context (Rink, 2010), we feel comfortable with the results obtained as an objective measurement of PTs' performances. In their study, Pruzak et al. (2010) found the use of Studiocode for analysis of event recordings to be reliable 83% of the time. However, they stated that discrepancies may occur when the interpretation of codes/labels are not clearly established. Based on their statement, clear codes were established for this study.

The present study had a small sample size ($n = 9$), which leads us to suggest the use of a larger sample size in future research projects to increase statistical power. Another suggestion would be to investigate differences, if any, in the delivery of feedback during lessons covering units of study such as football and soccer (invasion games) versus volleyball (net wall games) versus individual sports.

Future research should be focused on the effects of specific feedback protocols on PTs' delivery of feedback during FEs. A specific protocol could be aligned with the research of Sturyk and McCoy (1993), who suggested PTs benefit by concentrating and improving one area at a time rather than by dealing with several areas at once. This protocol may allow PTs to prioritize areas to be strengthened. Once areas have been prioritized, PTs can systematically focus on changing areas that need improvement.

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TEACHER EDUCATION

Inhibitors to Responsibility-Based Professional Development With In-Service Teachers

Michael A. Hemphill

Abstract

Researchers of continuing professional development (CPD) in physical education have called for new models that move beyond the traditional CPD model. The outcomes of CPD protocols are hard to predict even when they align with the best practices. Responsibility-based CPD has become the focus of recent attention to assist physical educators in increasing the use of responsibility-based teaching strategies. The purpose of this study was to examine inhibitors to responsibility-based CPD based on Hellison's teaching personal and social responsibility model. A novel CPD protocol was introduced to a group of teachers but was inhibited by philosophical differences between the teachers and university collaborators, perceptions of students' ability to take on responsibility, and strategic compliance with grant-related work.

Researchers of continuing professional development (CPD) in education and physical education (PE) have called for structural changes to the CPD model that advance it beyond a traditional model of CPD that is typically limited to short-term in-service workshops (Armour, Makopoulou, & Chambers, 2009; Borko, 2004; Webster-Wright, 2009). More successful CPD programs tend to be long term in duration, which often requires follow-up support

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beyond an in-service workshop (Birman, Desimone, Porter, & Garet, 2000; WestEd, 2000). Furthermore, CPD is most effective when teachers are engaged in collaborative learning with their peers formally and informally within the context of their teaching environment (Armour & Yelling, 2007; Webster-Wright, 2009). Providers of effective CPD programs also assess its impact on student learning outcomes (WestEd, 2000). Guskey (2000) argued that pupil learning is the most important part of CPD. Changes in teachers' attitudes and beliefs may only occur after they have experienced successful implementation that has a positive effect on students.

Despite the consensus on the important components of successful CPD, researchers have been unable to predict its outcomes (Opfer & Pedder, 2011). Many CPD programs have been characterized as ineffective largely because of the proliferation of traditional in-service workshops (Darling-Hammond & Richardson, 2009). However, other researchers have argued that providers of CPD model fail to consider how professional learning is embedded in teachers' working contexts or how teachers' personal experiences, preferences for CPD, and values influence the outcomes of CPD (Borko, 2004). Findings from CPD research often are not replicable to other settings and sometimes conflict with findings from similar studies (Nuthall & Alton-Lee, 1993).

Despite these findings, the underlying assumption in much of the work on CPD has been that effective professional development will improve teachers' instructional practices. In turn, this is likely to result in improved student performance. Therefore, identifying the central tenets of effective CPD has been the focus of research to promote replication in other settings (Opfer & Pedder, 2011). The format of CPD has received much attention, but it seems that the duration of activities may be more important. Programs that include significant contact hours over a period of time are associated with effective CPD (Guskey, 2002).

In terms of the activities, CPD seems to work best when it is aligned with daily activities of teachers (Garet, Porter, Desimone, Birman, & Yoon, 2001). This calls for providers of CPD to engage teachers with the materials (Borko, 2004), ideally in a classroom setting that empowers teachers to experiment with new strategies with their students (Hawley & Valli, 1999). Those types of activities tend to provide opportunities for teachers to reflect on new activities and strategies for student learning. Furthermore, the reflection

component can also empower teachers to make positive adaptations to the new materials (Webster-Wright, 2009).

Providers of CPD should also promote opportunities for teachers to collaborate, both formally and informally (Armour & Yelling, 2007; Birman et al., 2000). Providers of some programs have called for the development of communities of practice to sustain a focus on the purpose of CPD (Wenger & Snyder, 2000). However, the most appropriate amount of collaboration is context specific and is likely best defined with input from all professional development agents (Warren Little, 2002). Communities of practice in PE have traditionally been described as groups of teachers collaborating effectively to achieve a positive outcome (Armour et al., 2009; Deglau & O'Sullivan, 2006). However, Wenger (1998) suggested communities of practice may develop in any work setting in which responsibilities overlap. Communities of practice can be dysfunctional when there are disagreements, challenges, or competition among participants.

In a study of factors that enhanced and inhibited professional development in multiple schools, Bechtel & O'Sullivan (2007) reported that beliefs about the profession greatly affect excitement and interest in professional development. Hence, it is suggested that designers of professional development consider ways that teachers believe align with the goals of professional development. Additionally, perceived support from colleagues and administrators is considered to be an important factor for implementation and sustainability of professional development.

Teaching Personal and Social Responsibility in Physical Education

Hellison's (2011) teaching personal and social responsibility (TPSR) model is grounded in the notion that teachers can promote personal and social responsibility through sport and physical activity. The TPSR model has been cited as an exemplary curriculum model (Kirk, 1993), is among the featured main theme curriculum models cited in PE texts (Lund & Tannehill, 2010), and has become a regular component of PE teacher education (Doolittle, 2011). Physical educators have often used the TPSR model as a resource for addressing responsibility in their classroom.

Application of TPSR often takes place in after-school or community-based programs characterized by voluntary participation and

a small number of participants (Hellison, 2011). This contrasts with the compulsory nature of PE classes that leads to a group of students with varying degrees of interest and motivation in PE (Wright & Burton, 2008). Therefore, researchers are beginning to examine the potential of TPSR in school settings. From a teacher's perspective, there is the responsibility to meet other curricular goals related that are reflected in national or state standards. Furthermore, teaching styles and curriculum in other school subjects may be in conflict with that presented in the responsibility model (Gordon, 2010).

Martinek and Hellison (2009) noted that more research is needed on program leaders (e.g., teachers) related to their learning and implementation of the TPSR model. Most recently, Doolittle (2011) outlined the nine ways that TPSR has been implemented in PE teacher education. The strategies range from brief experiences such as a conference seminar to in-depth experiences such as semester-long courses. Programs that were longer in nature, included continuous feedback, and provided opportunities to work with students were the most effective (Doolittle, 2011). Few researchers have considered the learning experiences of in-service PE teachers; however, researchers in Canada have successfully used a self-supervision process to facilitate one teacher's implementation of the TPSR model. This model is one example of an effective professional development strategy as an alternative to traditional workshops (Beaudoin, Brunelle, & Spallanzani, 2010).

A central question raised by Hellison and Templin (1991) is, what is worth doing in school PE? The National Physical Education Standards are focused on a well-rounded approach to PE in which a physically educated student demonstrates competency in motor skills, understands movement concepts, participates in regular physical activity, achieves a health-enhancing level of physical fitness, exhibits personal and social responsibility, and values physical activity (American Alliance for Health, Physical Education, Recreation, and Dance [AAHPERD], 2013). Many teachers prefer to address each of those six areas, yet they make decisions about what is best for their programs (Hellison, 2011). In their review of the standards, Lund and Tannehill (2010) concluded, "It will be up to the teacher and each school district to interpret the standards based on values, beliefs, and philosophy what is ultimately important for students to know and do" (p. 29).

Purpose

The purpose of this study was to explore inhibitors to responsibility-based CPD with a group of in-service physical educators. A novel approach to professional development was employed that was designed to follow best practices.

Method

In this study, four teachers were introduced to a novel CPD protocol. The PE teachers were enlisted as key contributors and asked to undergo training that would enable them to observe their peers and conduct self-reflections. Prior to the inception of the study, I met with the teachers to discuss the CPD protocol and data collection. Based on each teacher's feedback, minor changes were made to the CPD protocol. For example, the teachers did not prefer to work collaboratively as a group of four. Instead, they requested for the male and female teachers to meet and experience the CPD separately. After those accommodations were made, each teacher agreed to participate. Based on my field notes at the time, each teacher was interested in participating in this CPD protocol because it was different from a series of workshops they had attended during the previous 2 years. The institutional review boards of the participating university and school district approved this study.

Setting

This study took place at a public coeducational school located in a midsize city that includes all of the seventh and eighth grade students in one school district. Approximately 1,000 students attend the junior high school and represent diverse ethnic backgrounds. Over half of the students were White (63%), 11% were Black, 18% were Hispanic, and 7% were multiracial. Sixty-five percent of students were on the free or reduced-price lunch program.

The school was in the final year of a 3-year federal grant. With support from the grant, the school made substantial upgrades to its facilities, purchased new equipment, and invested in CPD programs. Throughout the day, there are seven PE periods that range from 50–55 min. Class sizes varied; the smallest class had 15 students and the largest class had 39 students. Although PE classes were not coeducational, the boys and girls classes are often combined for unstructured activities.

Participants

The PE department includes four teachers in the late stages of their careers. Sarah, Ashley, and Derek have over 30 years of teaching experience. Terry has 18 years of experience following an initial career in the insurance industry. With the exception of Terry, the teachers plan to retire in the next 2 to 5 years.

Professional Development Protocol and Data Collection

Planning meeting. In November 2010, each teacher was presented with the CPD protocol and the research plan, which are outlined below. Hellison's TPSR model and related research were used as primary resources for introducing the teachers to responsibility-based teaching strategies. However, I emphasized that the TPSR model is not a one-size-fits-all approach. Instead, this was an effort to introduce responsibility-based teaching strategies and examine ways to integrate TPSR into their existing curriculum. It was suggested that the results could then lead to new knowledge about best practices for responsibility-based teaching in PE.

Training tools. The Tools for Assessing Responsibility-Based Education (TARE) were developed to address implementation fidelity of the TPSR model. The TARE instruments are aligned with Hellison's (2011) TPSR model and include nine responsibility-based teaching strategies. The TARE observation instrument has been established as a reliable and feasible instrument for assessing TPSR implementation and can assist in the implementation of responsibility-based teaching in K–12 PE programs (Wright & Craig, 2011). It includes a time-sampling methodology to document teachers' use of nine discrete teaching strategies: modeling respect, setting expectations, opportunities for success, promoting social interaction, assigning tasks, leadership, giving voices and choices, assessment, and transfer. Additionally, it includes holistic measurements of responsibility themes and student responsibility levels. The TARE post-teaching reflection was adapted from the observation instrument and serves as a self-report complement to the time-sampling tool. The TARE instruments were employed as training tools and were the central component of the CPD. The CPD protocol was designed to introduce the teachers to the responsibility-based teaching strategies through the training in the instruments used to assess those strategies and then follow-up with structured observations and reflections.

Training meeting. Each teacher met individually with me for two training meetings. During the first meeting, the teacher was presented with the TARE observation instrument (Wright & Craig, 2011) and post-teaching reflection (Hellison, 2011). I explained the protocol for using time-sampling observations. Once the teacher was comfortable with the TARE instruments, a practice coding session commenced using video observation.

During the second training meeting, the teacher and I independently coded a 45-min videotaped lesson using the TARE observation instrument. The tape was paused periodically to address questions. Following the coding session, the teacher and I shared observations. This meeting confirmed that the teachers generally understood the responsibility-based teaching strategies and could observe them in practice.

TARE observations. Following the training, all four PE teachers were observed teaching one PE lessons. Figure 1 illustrates the key roles of the observations: (a) instructor, (b) peer observer, and (c) researcher. The instructor was a PE teacher who led all instruction during the observation period. Another PE teacher served as the peer observer and observed an entire lesson alongside me. The peer observer and I used the TARE observation instrument. Immediately after teaching a lesson, the instructor completed the TARE post-teaching reflection. I compiled the results from the three documents and provided them to the teachers in an effort to provide feedback to promote further discussion and reflection. TARE observations were conducted at times convenient to the PE teachers over the 4-month semester.

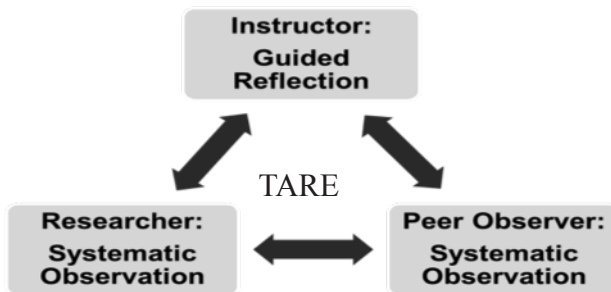


Figure 1. TARE observation cycle

Interviews. At the end of the CPD protocol, each teacher participated in two interviews, with the exception of Terry, who opted out of the second. The interview was semistructured, lasted between 45 min and 1 hr, and was focused on the teachers experience with the CPD protocol.

Observations. I visited Tuscola Junior High School two times per week over 4 months. During the visits, I observed PE classes and had informal discussions with the teachers. Following each visit, I audio recorded field notes and transcribed them for analysis.

Incomplete data. The CPD protocol and data collection was not completed as planned. As the CPD protocol began, the teachers opted out of much of the process including videotaped lessons and follow-up TARE observations. Each teacher taught one structured lesson to accommodate TARE observations, served as a peer observer, participated in at least one interview, and was observed on a weekly basis by me. Since the CPD protocol was based on completing multiple TARE observations, the CPD protocol was incomplete.

Data Analysis

Typological data analysis was employed in this study (Hatch, 2002). A typological analysis begins by dividing the overall data set into categories based on predetermined typologies, which can be based on theory, common sense, or research objectives. For this study, the predetermined typologies included the individual teachers, the school, the TARE instruments, and CPD. Once typologies were identified, the data were reviewed with one typology in mind. Once the typologies were organized into categories, an inductive analysis was conducted and themes were developed within each category. Following this, the themes were compared with those from the other categories. The resulting themes were supported by multiple data sources and evident within each of the typologies. A qualitative software program, NVivo 9 (QSR International, 2010), was used in the data analysis. The software program was designed to help organize and store the data (Patton, 2002).

Results

Over the course of the data collection for this study, observation notes indicated a pattern of unstructured activities. Although the classes were segregated by gender, during free play, activities became integrated. The teachers' role was primarily as observer and disciplinarian when needed. The following excerpt from a field note is representative of a typical PE lesson:

Ashley led the warm up activity. The students were instructed to jog the length of the basketball court. Upon blowing the whistle, they could stop and walk until the whistle came again. Following the warm up, Ashley literally said “go” as I am standing by the basketballs and the students race to get a ball. Most of the girls walk around the perimeter of the court... the girls don’t get much of a chance to play basketball although they seem to want a basketball. One girl even settled for a volleyball and shot it at the basketball hoop.

The unstructured setting made it difficult for me, and other university researchers, to follow through on professional development support. The following themes provide insights related to the Tuscola teachers’ perceptions of the CPD process.

University Collaboration

In the interviews, the four teachers provided mixed perceptions about the relationship between the university collaborators and the junior high school. Ashley stated, “[The university] was great about not making us feel pushed into it,” when referring to curriculum reforms. Sarah remarked, “I think everybody at [the university] is wonderful. I am not just saying that. I think you all have done a wonderful job in what you are doing and have helped us adjust to what you are doing.” The female teachers suggested that they had benefited from working with the university and appreciated this partnership.

Contrarily, the male teachers often highlighted philosophical differences that may have made it difficult for the professional development to be effective. For example, physical educators, especially those in higher education, have condemned dodgeball in PE (National Association for Sport and Physical Education, 2006). Terry argued, “Everybody at [the university] hates dodgeball, and they don’t understand that this is an activity that 100% of the kids get involved in and love.” He went on to argue at length about the educational benefits of dodgeball. Derek argued that the content offered in the professional development was not valuable: “[The university] didn’t have to bring some highfalutin professor in and pay him \$5,000 to teach me this. I learned from the school of hard knocks.”

The intent of the curriculum reform project was to improve the PE curriculum progressively in a way that is reflective of the National Physical Education Standards (AAHPERD, 2013). When asked about his philosophy, Terry said his priority was to

get [students] into an activity... where they are yelling and they are screaming... they are getting worn out so when they go back to English, science, math, etc., they sit in their seats and they listen and they learn.

The emphasis on free play and unstructured activity was noted in field notes throughout the duration of this study. These philosophical differences may have been a barrier to the adoption of responsibility-based teaching strategies.

Strategic Compliance

Although all four teachers agreed to participate in the CPD protocol, in my field notes, I recorded frequent occasions when the observations made teachers feel uncomfortable. However, the benefits of the large federal grant may have made the teachers more likely to comply with the data collection. For example, each teacher completed a lesson plan to accommodate a TARE observation. As recorded in the field notes, these lessons were not preceded by or followed by similar lessons. They had been designed specifically to accommodate my requests. The following field note excerpt explains my perception following the final TARE observation:

I think this was interesting because I have not observed hands-on teaching like Sarah did today, or Ashley last week, or like Derek and Terry when I observed them. So this process... facilitates some change. I think it is superficial in nature because the teachers immediately revert back to their old ways. They are very kind to me, kind enough to let me come and collect this data, even though they are very reluctant to be in the spotlight. I don't think we are going to see any sustainability in terms of using these strategies or even playing an up-front role in a classroom as teachers do. At the very least, this process puts them in a direct teaching situation.

To accommodate the TARE observations, however, each teacher planned one lesson based on his or her knowledge of the TPSR model and responsibility-based teaching strategy. The lessons followed the basic lesson format suggested by Hellison (2011) including awareness talks, a physical activity lesson with integrated responsibility, and a group meeting. During this lesson, each teacher demonstrated

the ability to use most of the responsibility-based teaching strategies. Over a 40-min lesson, each teacher was observed modeling respect, setting expectations, providing opportunities for success, fostering social interaction, and assigning tasks. With the exception of modeling respect, those teaching strategies were rarely observed before or after each teacher's single lesson.

Students as Barriers to Teaching Responsibility

Each teacher suggested that the socioeconomic and demographic characteristics of the students were inhibitors to using empowering teaching strategies such as leadership. The teachers described demographic shifts in the community that have occurred throughout their professional careers that have limited the potential of their teaching. Derek explained, "Every neighborhood has a community watchdog, and they are taking the community back from these delinquents, well they are the ones we are dealing with every day." Derek attributed students' "delinquent" behavior to "single parents [with] a different set of values." Terry seemed to concur with this sentiment: "Most of [the students] live with one parent. It is just different. They don't get it because they have never been taught how to get it." In regard to dealing with these socioeconomic barriers, Terry argued that the university researchers "don't have a clue what's going on when they are dealing with that."

The female teachers took a different tone when describing students. Ashley suggested that students are disrespectful "more than [she] would like to see it," but the "majority of kids are on task and are very helpful and very polite." Sarah admitted that some of the students are disrespectful, but the problems seemed manageable. She gave one example: "In my last hour class, I hope to get them to not be talking when I am talking" before the end of the semester.

Although the male and female teachers offered different perspectives, both female teachers seemed just as reluctant to empower students to take on advanced levels of responsibility. For example, Sarah noted that the students were surprisingly good at assigned tasks such as keeping score during a volleyball game, but commented, "I don't think they can handle the self-directed stuff," referring to self-directed physical activity. According to Ashley, it is hard to trust the students to take on responsibility: "I don't want to say that we can't trust [the students], but we can't trust them."

Girls, Boys, and Athletes

Given that the PE classes were segregated according to gender, it was not surprising that gender-specific issues arose. For the male teachers, who also coached male sports, the student-athletes were best positioned to take on responsibility. According to Terry, his position as a football coach had earned him the respect of the student body:

You get these football players... that's about 10% of the school. You get 10% of the kids and it doesn't matter whether they are Black, whether they are Hispanic, whether they are White, when you say "I want this done now." It will be "yes sir," and the other kids see that and they fall right in line with it.

Terry went on to suggest that when he took a year off from coaching that he "found out that if you don't coach and all you do is teach, the way [the students] look at you is completely different."

Derek suggested that it is hard to trust students with responsibility, but on the other hand, he said he has "given responsibility to the kids that played soccer, the kids that have played football, I let them be captains and things like that." Terry echoed this sentiment and elaborated, "I don't know if [students] learn leadership skills in [physical education], but they do on the football team."

The female experience in PE was characterized as lacking effort, interest, and engagement. Ashley explained that the girls "don't want to be very good at this age level... they don't want to show too much skill." Earlier in their teaching careers, the teachers had tried integrated flag football activities. Ashley explained, "It got to a point where the boys were throwing the ball so hard that the girls couldn't catch it... we decided to keep them separate." However, Sarah explained that they continue to play flag football:

We do try to play flag football even though they are not interested... it is something they can play when they get to college intramurals, when they attend a picnic at church, so we try to expose them to that even though they don't buy into it.

When asked to elaborate on why the girls seemed to be disinterested in PE, Ashley suggested,

They don't want to be very good at this age level... I don't think they want to be singled out as higher-up athletically. They want everybody to see how smart they are, but physically they just don't want to show it. I think it's a hormonal thing.

Discussion

In theory, the responsibility-based CPD protocol that was used in this study aligns closely with some of the best practices for CPD (Birman et al., 2000; Borko, 2004) and more specifically with effective CPD methods for teaching personal and social responsibility (Doolittle, 2011). The protocol was designed to initiate a sustained focus on responsibility-based teaching throughout an academic semester through periodic TARE observation experiences, reflection, discussion, and collaboration among colleagues and periodic visits by the investigator. However, the protocol failed to adhere to the key findings of Bechtel and O'Sullivan (2007). Findings indicate that a belief system that does not align with responsibility-based CPD is a significant hindrance to its implementation.

Many positive outcomes have been associated with teaching personal and social responsibility in PE (Hellison & Martinek, 2006). Focusing on such potential may have promoted a greater interest in responsibility-based teaching strategies. For example, the TPSR model has been cited as a student-centered instructional model with the potential to promote gender equity in PE (Wright, Stockton, & Hays, 2008). Other research has demonstrated that responsibility-based PE programs promote effort and enjoyment (Wright & Li, 2009). CPD program providers could look to find creative ways to link this research to practice in an effort to combat teachers' perceptions that inhibit the potential of CPD, such as the perception of girls being disinterested in sport and PE (Cooky, 2009).

A second failed assumption of this CPD protocol was that the PE program included opportunities for students to be successful, which is foundational to responsibility-based teaching (Hellison, 2011). Terry argued, "100% of the kids get involved with dodgeball." However, the National Association for Sport and Physical Education (2006) concluded that dodgeball "provides limited opportunities for everyone in the class" to participate. Observations reveal that the structure of free play often privileged the kids who were able to obtain a basketball. These findings are unfortunate, but such

information was available before the inception of the CPD protocol. A better understanding of the challenges and opportunities available at Tuscola may have facilitated a CPD protocol designed to meet the most urgent needs of the school.

This study was focused on the responsibility-based CPD protocol, and the flaws in the protocol draw attention to underlying issues in PE. Sabo and Veliz (2008) reported that girls spent less time in PE class than boys. The multisite study ($N = 2,379$) showed a precipitous decline in physical activity associated with the lack of PE among adolescent girls, and this decline increased significantly through their teen years. In the current study, the boys and girls received equal amounts of PE, but the girls' experience, interests, and engagement in PE was markedly different. Previous research indicates that some girls prefer a participation model of PE that emphasizes cooperative play over competitive sports (Cooky, 2009; Ennis, 1999). This suggests that the female teachers' perception that the girls preferred not to demonstrate physical skills may be misguided. With a more effective CPD protocol, these types of assumptions can be identified and challenged.

Teachers' values have a significant effect on their curricular decisions and their willingness to engage in curriculum development through CPD (Ennis, 1994). For example, students' disruptive behavior in class tends to impact teachers' willingness to teach personal and social responsibility (Ennis, Ross, & Chen, 1992). In CPD programs, the congruence of teachers' values and curriculum should be emphasized, and those factors should be linked with the relevant PE standards. Prior to the initiation of this study, teachers' values were not considered. It was assumed that the teachers would be interested in updating their teaching to align with the National Physical Education Standards (AAHPERD, 2013). However, the interviews and observations reveal that the teachers' values inhibited the success of the CPD. Hellison (2011) suggested that core values of values-based programs should be acknowledged from the outset. Values implicit in this CPD protocol include empowering students to have a voice in their program, to set and strive for internal goals, and to have frequent opportunities to experience leadership roles. The data in this study demonstrate how those values prohibited the success of the CPD protocol.

The university collaboration with the school corporation was beneficial as the school received a federal grant that provided significant facility upgrades, CPD for PE teachers, and opportunities to conduct research. These factors may often facilitate positive collab-

orations between teachers and researchers, but in this case, it facilitated strategic compliance. Recognizing the considerable benefits of the partnership, the teachers may have felt pressure to comply with requests for research even when given options to opt out of them. Linking universities with community schools has been a successful strategy for teaching personal and social responsibility (Hellison et al., 2000) and for CPD in PE (Ward, 1999). This specific responsibility-based CPD protocol did not meet the objectives for the school (professional development) or the university (research on professional development).

The findings of this study raise important implications. Successful collaborations between universities and school PE programs have often included PE researchers providing in-service workshops and other support for CPD (Ward, 1999). This was the case for the current study. This approach has proven useful in many cases, but it was inadequate for this particular setting. This raises the question, is professional development in this particular setting doomed to failure, or were there other options that may have been more successful? Finally, how could the CPD provider predict that this protocol would be unsuccessful even after it had been successful in a similar setting?

It is true, as the teachers in this study indicated, that schools are faced with challenges related to social stratification (Lawson, 1998). For late career teachers, the changing demographics may create different working contexts than those of earlier career stages. Perhaps the university collaboration could be expanded to address these issues. Doing so would require the CPD provider to rethink some of the initial assumptions about professional development, perhaps through a needs assessment. In this study, that might have revealed some of the barriers to the teachers' perceptions of students' potential to take personal and social responsibility.

Rethinking CPD to address these issues would have required CPD providers to consider how to challenge Terry's assumption that dodgeball is an appropriate sport in which 100% of students participate. CPD providers would also have been required to challenge the perception that girls do not want to appear to be skilled in a PE class. Most large universities have experts in areas that can address issues beyond pedagogy, such as the gender issues illustrated in this study. Equally important, PE classes can provide relevant venues for research on topics beyond PE pedagogy and professional development. There is a potential for a broader partnership to address issues

such as those in this study that prohibited successful professional development, but more important, that may limit the value of PE for students.

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TEACHER EDUCATION

Pairing Learners by Companionship: Effects on Motor Skill Performance and Comfort Levels in the Reciprocal Style of Teaching

Constantine Chatoupis

Abstract

Mosston and Ashworth's (2008) reciprocal style of teaching gives learners the opportunity to work in pairs to support each other's learning (one practices a task and the other gives feedback). The effects of pairing learners by companionship (friend and non-acquaintance) on 8-year-old children's motor skill performance and comfort levels were explored in this study. The participants (N = 52) were randomly assigned to a treatment group (n = 40) or a control group (n = 12). Prior to the study, learners in the treatment group were paired by companionship (partners who were friends and partners who were not friends). The same dribbling tasks were taught to the learners in all groups (eight 30-min sessions). A soccer dribbling test and a 7-point semantic differential scale were employed to evaluate the dribbling skill and how comfortable the learners felt giving and receiving feedback, respectively. The results show that learners paired with friends felt more comfortable in giving and receiving feedback than learners paired with nonacquaintances. Also, motor skill development was greater in learners paired with friends than learners paired with nonfriends or learners in the control group. The study supports certain tenets set forth by Mosston and Ashworth (2008) for the reciprocal style.

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The Spectrum of Teaching Styles (Mosston & Ashworth, 2008) is an organized collection of observable teaching styles that provides a framework to identify or ask more insightful research-based questions. According to Mosston and Ashworth (2008), the Spectrum of Teaching Styles consists of a continuum of 11 styles, each of which emerges as decisions shift between teacher and learner.

A teaching style that has drawn the attention of many researchers and has been used extensively by physical education (PE) teachers is the reciprocal style of teaching (Chatoupis, 2010; Cothran et al., 2005). In the reciprocal style, learners are organized in pairs with each member assigned a specific role. One learner is the doer who performs the task and the other is the observer who offers immediate and ongoing feedback to the doer using a criteria sheet designed by the teacher. At the end of the first practice, the doer and the observer switch roles (Mosston & Ashworth, 2008).

Mosston and Ashworth (2008) argued that certain strengths are realized in this style of teaching: (a) Learners learn to give feedback to a peer, which results in a higher number of correct responses by the doer because of the increased frequency of feedback provided by the observer; (b) learners learn to give and receive feedback with a peer, which results in an expansion of learner socialization skill; and (c) learners learn to perform and analyze movements by observing the performance of the doer, comparing the performance against criteria, and drawing conclusions about the accuracy of the performance.

A number of researchers employing the reciprocal style or teaching strategies that facilitate peer education practice have examined learner psychomotor and social behavior. In a series of Spectrum studies, the reciprocal style proved to enhance school children's motor performance in athletic activities including rifle shooting (Boyce, 1992), hockey (accuracy task; Goldberger, 1983; Goldberger & Gerney, 1986; Goldberger, Gerney, & Chamberlain, 1982), lacrosse (accuracy task; Goldberger, 2006), basketball performance (chest pass; Kolovelonis, Goudas, & Gerodimos, 2011), juggling (Ernst & Byra, 1998), and lower complexity climbing skills (Hennings, Wallhead, & Byra, 2010).

Two recent reviews on peer tutoring (also known as peer teaching) in PE indicate that pairing by ability or gender has some effect on motor skill development and performance (Jenkinson, Naughton, & Benson, 2014; Ward & Lee, 2005). The above findings are similar with the findings obtained for general education (Cohen, Kulik, & Kulik, 1982; Robinson, Schofield, & Steers-Wentzell, 2005).

Interesting results were yielded when the conditions for immediate feedback were examined (pairing by ability or companionship). Byra and Marks (1993) looked at the effects of two learner-pairing techniques in the reciprocal style on the frequency of the observer feedback and perceived comfort while learning the soccer juggling and dribbling skill. When elementary school children were paired by companionship (friend and no acquaintance), the observers gave specific feedback more frequently to friends than nonacquaintances, and the doers felt more comfortable receiving feedback from friends than nonacquaintances. When paired by ability level (high, low, and mixed), they reported no effect on the amount of specific feedback provided by the observer or on the doer's comfort in receiving feedback.

In a similar study by Ernst and Byra (1998), no significant effects of pairing by ability level on skill performance (juggling) or on learner perceived comfort giving and receiving feedback from a partner were detected. However, the mean scores indicated favorable learner perception toward comfort and value related to giving and receiving feedback.

Research on the effects of friendship on learner processes and outcomes conducted in classroom settings has revealed that "likeableness" (the observer's liking of the doer) was significantly related to academic success (Little & Walker, 1968) or was predictive of observer–doer interaction (Ehly, 1980; Ehly & Larsen, 1976).

In summary, teaching literature indicates that pairing by companionship or ability seems to have a significant effect on learner process and outcome variables.

Purpose of the Study

To date, the effectiveness of pairing by companionship (friend or nonacquaintance) on motor skill performance and on learner perceived comfort in giving and receiving feedback in elementary PE school settings has not been thoroughly investigated. Although there is little to say about how best to group learners (Ward & Lee, 2005), pairing by friends warrants further investigation (Jenkinson et al., 2014).

The main purpose of this study was to investigate if pairing Greek children by companionship (friend and nonacquaintance) in the reciprocal style of teaching can promote certain learning outcomes. Based on the previously discussed research, and given that usually learners are more successful and experience more enjoy-

ment when working with someone they know and like (Mosston & Ashworth, 2008; Siedentop, 1991), it was hypothesized that working with friends would be more effective in terms of motor skill development and comfort levels than working with nonfriends within the framework of the reciprocal style of teaching.

Method

Participants

Fifty-two Greek children, 25 boys and 27 girls, participated in the study. The mean age of the children was 8.13 years ($SD = 0.15$). The participants were Caucasian with similar socioeconomic (middle class), ethnic, and religious backgrounds. Children were chosen based on the following criteria: (a) They had experience with working in pairs and giving and receiving feedback from their peers, (b) they exhibited few behavioral problems, and (c) they had little experience in the dribbling skill. Children did not know whether they were in the treatment group or in the control group.

The children were taught by the same male instructor who had 5 years of teaching experience in elementary PE settings. As a post-graduate student and later as an in-service teacher, the instructor was trained in the appropriate use of the Spectrum of Teaching Styles. In addition, in the most recent years of teaching, the instructor had taught using many of Mosston and Ashworth's (2008) teaching styles, including the reciprocal style of teaching, with elementary-aged school children. The participants in this study did not previously know the instructor. Having one instructor provide all instruction helped to control for unplanned variability in the instructor factor.

Setting

The study lasted 2 weeks. Physical activity instruction was provided four times a week, 30 min per session, thus giving eight sessions for each group. Instruction took place outside the curriculum time in a gymnasium used by the students during their regular PE lessons. The gymnasium could comfortably hold up to 25 children at one time. The children received an orientation to the instruction prior to the first session. This included an introduction to the expectations of the teaching style and familiarization with the instructor, the playground, and the equipment. Special emphasis was given to the observer's role in offering feedback to the doer and communicating with the instructor. The parents of the children signed consent forms for their child's participation in the study.

Learner Pairing

Before the study began, learners classified their classmates as “best friends,” “friends,” “know the students name,” or “don’t know the students name.” Learners identified as “best friends” or “friends” were categorized as friends. Learners identified as “know the students name” or “don’t know the students name” were categorized as nonacquaintances. After 12 learners were randomly assigned to the control group, the remaining 40 learners were randomly assigned to two intervention groups as follows: Twenty friends in the friend group and 20 nonacquaintances in the nonacquaintance group. All pairs were of the same gender as learners had been in the habit of working with partners of the same gender in their regular PE classes.

Session Content

The content of each session was based on the skill theme development approaches as described by Graham, Holt/Hale, and Parker (2010). In particular, the tasks included traveling in pathways and dribbling around stationary obstacles. For example, each learner has a ball and dribbles the ball around the outside of the cones in his or her own personal space. Also, learners dribble their soccer ball around the activity area following a certain path with curves drawn on the ground.

The design and the selection of the tasks were based on information provided in Mosston and Ashworth’s (2008) and Graham et al.’s (2010) textbooks. The tasks were the same for the children in the treatment and control groups.

Interventions

Treatment group. Each session began with the instructor stating the reasons for using the reciprocal style and explaining the role of the instructor, the learner who gives feedback (observer), and the learner who practices the task (doer). Then he described and demonstrated the dribbling task to be executed and explained the criteria sheet (see Figure 1). The criteria sheet included instructions on how to complete the task, space for recording results, and examples of positive specific and corrective performance. If learners did not have questions for clarification, they began by selecting their peer, picking up criteria sheets, and settling down to the performance of their roles. The observers offered continuous feedback to the doers while they were practicing the task. The instructor moved from one observer to the other, heard the interaction, and acknowledged the

observer. When task execution was over, the learners switched roles and repeated the task. During session closure, the instructor offered feedback to the entire class, addressing the role of the observer.

Instruction to the learner:

To the doer:

Task 1. Dribble the soccer ball around the end cone and back. Go as quickly as you can while keeping the ball under control. Stop and rest after each trial while the observer provides feedback. Complete five trials.

Task 2. Dribble the soccer ball through the three-cone course. Go as quickly as you can while keeping the ball under control. Stop and rest after each trial while the observer provides feedback. Complete five trials.

To the observer:

Analyze the doer's form by comparing the performance with the criteria listed below. Offer feedback about what is done well and what needs to be corrected. Check the criteria listed below. Switch roles after both tasks have been completed.

Task criteria	Correct	Needs work
1. Ball close to feet, within 1 foot?		
2. Body under control?		
3. Head up, looking ahead?		
4. Using instep of foot?		
5. Using both feet?		

Examples of feedback:

1. The ball was close to your feet on that trial. Good job!
2. The ball was too far from your feet on that trial. Try slowing down.
3. I like how you used the instep of your foot while you were dribbling.

Figure 1. Reciprocal teaching style criteria sheet for soccer dribbling.

Control group. The children assigned to the control group received instruction under the canopy (umbrella) of the practice style. Each session included a short demonstration of the content and a description of the logistical parameters (e.g., quantity, time limits, equipment, materials). Then the participants practiced the tasks individually and privately. During practice, the instructor circulated and provided private feedback for organization/managerial and discipline purposes. At the end of each session, the instructor assembled

the children and offered feedback to them about their participation in the tasks.

Instrumentation

The soccer dribbling skill test (Keith, 1980) was administered to assess learners' dribbling skill. Six cones were set up 2 yd apart over a distance of 10 yd. Each learner was instructed to begin with the ball at her or his feet at the first cone and dribble in and out of the cones in a zigzag fashion around the end cone and back to the starting point. Time was measured (to the nearest tenth of a second) from the moment the learner made contact with ball (player-initiated test) until both learner and ball crossed the finish line. Each learner performed two timed trials, with the lowest (fastest) timed trial being recorded. Time represents the participants' skill outcome score.

A questionnaire was employed to measure how the learners perceived working with a partner (see Byra & Marks, 1993, and Figure 2). A 7-point semantic differential scale was employed to answer each statement. The scale consisted of three positive, three negative, and one neutral point. A semantic differential scale involves the rating of concepts using bipolar adjectives. These adjectives represent opposite meanings with scales anchored at two extremes (Ernst & Byra, 1998). A score of 1 indicates the highest perceived comfort and a score of 7 indicates the lowest perceived comfort.

Pairing Learners by Companionship								
1. In today's lesson, I felt comfortable giving feedback to my partner.								
Comfortable	1	2	3	4	5	6	7	Uncomfortable
2. In today's lesson, I felt comfortable receiving feedback from my partner.								
Comfortable	1	2	3	4	5	6	7	Uncomfortable

Figure 2. Perceived comfort questionnaire form.

The initial administration of the questionnaire (pretest) was given just before the study started, and the second administration of the questionnaire (posttest) was given right after the completion of the study. One session was used to administer the questionnaire to the learners. Prior to completion of the questionnaire, instructions were given to the learners on how they should complete it. It took learners approximately 10 min to complete the questionnaire.

Two weeks before the study, the questionnaire was translated into Greek and was administered to the same learners on two occasions to estimate its reliability. Seven days were scheduled between the two administrations. Intraclass correlation coefficients were calculated for each of the two statements: $R = .81$, $R = .79$. Both values indicate high reliability.

Teaching Style Verification

Fidelity between the instructor's behavior and the style-specific behaviors were ascertained using the style analysis checklist for the reciprocal style (Sherman, 1982). The checklist requires a coder to determine whether the teacher or the learner exhibited the behavior in each statement. The reciprocal style checklist contains 33 possible behaviors (Figure 3).

Twenty-one of the possible behaviors are behaviors the teacher should exhibit for pure style implementation. The learner should exhibit the remaining behaviors. Behaviors that are not exhibited or exhibited by the incorrect party (teacher or student) are not circled (Ernst & Byra, 1998). To verify that the instructor was exhibiting behaviors specific to the canopy of the practice style in the control group, the practice style checklist was used (Figure 4).

In the current study, scores of 25 (75%) and 26 (76%) were obtained from the two trained coders. Fidelity between the instructor's behaviors and the style-specific behaviors was, therefore, ascertained.

Coder Reliability

The two coders were trained by the author to use the reciprocal style and the practice style checklists. Training lasted approximately 5 hr. Initially, the coders learned to analyze reciprocal and practice style teaching episodes by coding eight episodes under the supervision of the researcher. Following, the coders analyzed eight more reciprocal and practice style episodes independently. Each style analysis checklist was then compared to the researcher's results. Practice continued until interobserver and intraobserver agreement, estimated with Scott's coefficient (van der Mars, 1989), exceeded 0.75. An 87% intraobserver and 91% interobserver agreement level were obtained.

Directions: Identify who makes the specific decision by circling T (teacher) or L (learner).

PHASE 1: SETTING THE SCENE/ROLE IDENTIFICATION

- T L 1. Locates and positions learners.
- T L 2. Names the teaching style.
- T L 3. States the objectives of the teaching style.
- T L 4. Describes the learner's role, the "shift" in nine decisions.
- T L 5. Shifts posture decision to learners.
- T L 6. Repositions learners.
- T L 7. Describes the teacher's role.
- T L 8. Asks questions for role clarification.
- T L 9. Answers questions for role clarification.

PHASE 2: SETTING THE SCENE/SUBJECT MATTER IDENTIFICATION

- T L 10. Announces the general subject matter.
- T L 11. Announces the specific task(s).
- T L 12. Delivers the task(s) to the learners ("show and tell").
- T L 13. Establishes quantity and quality of task performance.
- T L 14. Establishes order of task performance if not random.
- T L 15. Establishes parameters and logistics for the nine decisions.
- T L 16. Solicits and answers questions for task clarification.
- T L 17. Shifts starting time decision to learners: "You may begin when you are ready."

PHASE 3: PERFORMANCE OF THE TASK

- T L 18. Performs the task(s).
- T L 19. Makes the nine impact decisions, within designated parameters: posture, location, order, starting time, pace and rhythm, stopping time, interval, attire and appearance, and questions for clarification.

PHASE 4: EVALUATION AND FEEDBACK

- T L 20. Moves around classroom, monitors task and role performance of individual learners.
- T L 21. Evaluates learners, offers individual and private feedback to learners about task and roles.
- T L 22. When deemed necessary, adjusts episode at critical moments.

PHASE 5: END-OF-LESSON CEREMONY ("CLOSURE")

- T L 23. Locates learners.
- T L 24. Summarizes main points of lesson.
- T L 25. Offers feedback to learners for role performance.
- T L 26. Answers learner-initiated questions for clarification.
- T L 27. Announces coming events.
- T L 28. Closes the episode (i.e., collects equipment and materials, rearranges classroom, bids farewell to learners, dismisses the class).

Figure 3. Reciprocal style analysis checklist.

Directions: Identify who makes the specific decision by circling T (teacher), L (learner), or O (observer).

PHASE 1: SETTING THE SCENE/ROLE IDENTIFICATION

- T L 1. Locates and positions learners.
- T L 2. Names the teaching style.
- T L 3. States the objectives of the teaching style.
- T L 4. Identifies the triad, describes its structure and function.
- T L 5. Describes the roles of the doer, observer, and teacher

PHASE 2: SETTING THE SCENE/SUBJECT MATTER IDENTIFICATION

- T L 6. Announces the general subject matter.
- T L 7. Announces the specific task(s).
- T L 8. Delivers the task(s) to the learners (“show and tell”).
- T L 9. Establishes quantity and quality of task performance.
- T L 10. Establishes order of task performance if not random.
- T L 11. Delivers the criteria (explains what a criterion is and how to use it).
- T L 12. Establishes parameters and logistics for the nine decisions.
- T L 13. Solicits and answers questions for task clarification.
- T L 14. Announces, “Select a partner. Decide who will first be doer and observer, and then begin.”

PHASE 3: PERFORMANCE OF THE TASK

- T L 15. Selects a partner.
- T L 16. Decides who is first doer and observer.
- T L O 17. Makes the nine impact decisions, within designated parameters: posture, location, order, starting time, pace and rhythm, stopping time, interval, attire and appearance, and questions for clarification.
- T L O 18. Performs the task.
- T L 19. Switches roles of doer and observer.

PHASE 4: EVALUATION AND FEEDBACK

- T L O 20. Has the criteria sheet.
- T L O 21. Monitors the performance.
- T L O 22. Compares and contrasts task performance against criteria.
- T L O 23. Draws conclusions about accuracy of task performance.
- T L O 24. Offers task-related feedback to doer.
- T L O 25. Initiates communication with the teacher if necessary.
- T L O 26. Moves around classroom, visiting each pair of learners.
- T L O 27. Responds to communication initiated by the learner.
- T L O 28. Reminds learners about details of task and roles if necessary.
- T L O 29. Offers role-related feedback to observer and doer.
- T L O 30. Makes episode adjustments when necessary.

PHASE 5: END-OF-LESSON CEREMONY (“CLOSURE”)

- T L 31. Locates learners.
- T L 32. Summarizes main points of lesson.
- T L 33. Offers role-related feedback to learners based on objectives of the reciprocal style.

Figure 4. Practice style analysis checklist.

Sessions taught to the treatment group were audio–videotaped every other day. Sessions taught to the control group were audio–videotaped once a week. The video camera, which was positioned to capture the movements of all learners and the teacher, was located in a discreet place to reduce the participants’ reactivity to it.

Data Analysis

Mean and standard deviation scores were calculated for the dependent variables for each group. Eta-squared was also computed to assess effect size in an effort to determine the degree to which the intervention impacted dribbling skill as well as perceptions about working with a peer. To examine changes in the children’s dribbling skill scores, a 3×2 (Group \times Test) repeated measures analysis of variance was employed. Changes in perceptions about working with a peer from pretest to posttest were tested with a 2×2 (Group \times Test) repeated measures analysis of variance. The 0.05 level of significance was employed for all analyses.

Results

Skill Performance

A 3×2 (Group \times Test) repeated measures analysis of variance showed a significant interaction between groups and test, $F(2, 49) = 61.877, p = 0.0001, \eta^2 = 0.72$. Post hoc analysis for the dribbling scores revealed a significant improvement from pretest to posttest for the friend group, but not for the nonacquaintance and control groups. The pretest and posttest mean and standard deviation scores for dribbling performance are presented in Table 1.

Table 1

Means and Standard Deviations for the Dribbling Skill Scores by Groups

Friend <i>n</i> = 20		Nonacquaintance <i>n</i> = 20		Control <i>n</i> = 12	
Pretest <i>M</i> (<i>SD</i>)	Posttest <i>M</i> (<i>SD</i>)	Pretest <i>M</i> (<i>SD</i>)	Posttest <i>M</i> (<i>SD</i>)	Pretest <i>M</i> (<i>SD</i>)	Posttest <i>M</i> (<i>SD</i>)
25.19 (1.78)	22.58 (1.91)	24.60 (1.68)	24.56 (1.68)	24.51 (1.63)	24.35 (1.73)

Perceived Comfort Giving Feedback

A 2×2 (Group \times Test) repeated measures analysis of variance showed a significant interaction between groups and test, $F(1, 38) = 94.79$, $p = 0.0001$, $\eta^2 = 0.71$. Post hoc analysis for the questionnaire scores revealed a significant decrease of the perceived comfort giving feedback scores from pretest to posttest for the friend group, indicating favorable perception, and a significant increase for the nonacquaintance group, indicating an unfavorable perception. Means and standard deviations for observer perceived comfort giving feedback are reported in Table 2.

Table 2

Means and Standard Deviations for Perceived Comfort Giving Feedback

Test administration	Friend <i>M (SD)</i>	Nonacquaintance <i>M (SD)</i>
Pretest	1.80 (0.77)	2.00 (1.02)
Posttest	1.35 (0.59)	5.60 (1.04)

Perceived Comfort Receiving Feedback

A 2×2 (Group \times Test) repeated measures analysis of variance showed a significant interaction between groups and test, $F(1, 38) = 154.87$, $p = 0.0001$, $\eta^2 = 0.80$. Post hoc analysis for the questionnaire scores revealed a significant decrease of the perceived comfort receiving feedback scores from pretest to posttest for the friend group, indicating favorable perception, and a significant increase for the nonacquaintance group, indicating an unfavorable perception. Means and standard deviations for observer perceived comfort receiving feedback are reported in Table 3.

Table 3

Means and Standard Deviations for Perceived Comfort Receiving Feedback

Test administration	Friend <i>M (SD)</i>	Nonacquaintance <i>M (SD)</i>
Pretest	1.80 (0.76)	2.00 (1.02)
Posttest	1.10 (0.45)	6.00 (0.86)

Discussion

Skill Performance

Pairing by companionship had differential effects on motor skill performance. Learners paired with a friend showed significant improvement from pretest to posttest, whereas learners paired with a nonacquaintance or in the control group did not. This result seems to corroborate previous research findings that tutor's liking of the tutee was significantly correlated with academic achievement (Little & Walker, 1968). It is plausible to suggest that pairing learners with friends fosters a class climate in which peers are at ease with one another, thus leading to greater skill learning. When learners select their partners, the episode begins more swiftly and continues more productively (Mosston & Ashworth, 2008).

The almost stagnant performance over time (pretest to posttest) of those paired with a nonacquaintance may be because of the short duration of the study. It makes sense to suggest that with a longer intervention period, learners in that group might develop more tolerance, patience, and empathy toward their peers, and that, in turn, might lead to greater gains in learning.

The above results suggest that when learners are instructed with the reciprocal style of teaching, they can achieve considerable gains in skill learning, particularly learners who are paired with friends. These results support previous research (e.g., Ernst & Byra, 1998; Goldberger et al., 1982; Goldberger & Gerney, 1986; Hennings et al., 2010; Kolovelonis et al., 2011) as well as Mosston and Ashworth's (2008) claim that learners learn motor skills in the reciprocal style of teaching by observing the performance, comparing the performance against criteria, and giving appropriate feedback. It seems that increases in learner achievement are related to the increase of opportunities to respond and provision of specific feedback (Jackson & Dorgo, 2002; Maheady, 1998), which are conditions fostered in the reciprocal style.

Comfort Levels

Significant differences were revealed for the two treatment groups across the two questionnaire administrations for any of the two questionnaire statements. Unlike the nonacquaintance group, the friend group had a favorable perception related to giving and receiving feedback. The mean scores of the friend group decreased over time, showing a favorable perception, whereas the mean scores

of the nonacquaintance group increased, showing an unfavorable one. It seems that when learners give feedback to or receive feedback from a friend, they feel more comfortable in their role.

These results indicate that pairing learners by companionship has a significant effect on comfort levels, thus supporting previous similar findings (Byra & Marks, 1993; Ehly, 1980; Ehly & Larsen, 1976). In addition, the present study supports Mosston and Ashworth's (2008) tenet that usually people enjoy working with someone they know and like and it is more comfortable to give and receive feedback with a person one likes and trusts.

Conclusions and Recommendations

The results of this study support Mosston and Ashworth's (2008) contentions about the reciprocal style of teaching. Within the limitations of the study (i.e., 52 children, aged 8, performing dribbling tasks), children paired with a friend in the framework of the reciprocal style not only improved motor skill performance but also felt that working with a peer was a positive experience. This information suggests that PE teachers who value outcomes related to social relationships and conditions for immediate feedback need to employ not only the reciprocal style but also the appropriate pairing technique.

In particular, if teachers are to encourage learners to give and receive feedback, they should allow learners to choose the partner they want and consider as tolerant, patient, and supportive. In addition, if the goal is to succeed in motor skill performance, the pairing technique that seems to accommodate the above goal is learner selection (learners select each other).

More replication studies as well as further research conducted with different age groups, sports skills, and other teaching styles are needed. In addition, it would be interesting to examine the following topics through the use of quantitative or qualitative research methods: (a) What effects do other pairing techniques have on the same or other product outcomes? (b) How does changing the pairing techniques within a series of lessons affect social tolerance and communication among members of a class? (c) Can learners develop patience and tolerance in dealing with their peers who are not friends? These are some of the many questions concerning the reciprocal style of teaching that need to be investigated.

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TEACHER EDUCATION

Physical Educators' Perceptions of Their Use of NASPE Standards

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Abstract

The rate of childhood obesity in the United States is approximately 17%. Because physical education can be a key intervention strategy against this epidemic, this study was conducted to determine physical educators' perceptions on their use of recommended national standards specifically focused on physical fitness and activity in their classroom. An online survey was distributed to 101 physical education teachers from nine states in which participants were asked to provide their opinion of several Likert-based questions that ascertained use of National Association for Sport and Physical Education (NASPE) Standards 1, 3, and 4. Teachers were found to incorporate the components of these standards at varying rates. More experienced physical education teachers spent less instructional time on movement fundamentals and combining skills than did less experienced teachers. Furthermore, they assessed student enjoyment significantly less in higher grades than in lower grades. Physical educators teaching higher grade levels as well as those with more contact time with students spent less instructional time teaching movement fundamentals, balancing skills, carrying and lifting techniques, and motor skills. Over 40% of participants had 2 or less hours of contact time per week. Thus, how effective a physical educator can be with limited time is uncertain, and al-

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though physical educators have a unique opportunity to address childhood obesity challenges, they must be provided the time and opportunity to do so.

Childhood obesity has been rising steadily since the mid-20th century (National Center for Health Statistics [NCHS], 2010). Concurrent with this rise is an increase in diseases associated with obesity in children including cardiovascular disease, type 2 diabetes, hypertension, and dyslipidemia (Gardner, Gardner, & Sowers, 2008; Shmulewitz et al., 2006).

The prevalence of childhood obesity across the United States is approximately 17% (Ogden, Carroll, Kit, & Flegal, 2014). Although lower in adults, trends in obesity among children indicate a steady increase (Levy, Vinter, Richardson, St. Laurent, & Segal, 2009). In the United States, from the early 1960s until 2006, the number of children who are overweight or obese has doubled (Sebelius, Frieden, & Sondik, 2010). Thus, there is an increasing need not only to treat diseases associated with obesity, but also to determine what strategies might combat its development during childhood.

The Importance of Physical Education

Health problems that develop in adolescence often persist into adulthood (Fennoy, 2010), which emphasizes the importance of providing education and interventions in early childhood (Baghurst & Eichmann, 2014). It is unfortunate, however, that increases in levels of childhood obesity have corresponded to a decrease in the physical activity of children in physical education (PE) classes (Kern & Calleja, 2008; Salmon, Dunstan, & Owen, 2008; Whitt-Glover et al., 2009), which highlights the importance of this discipline within a student's education.

Physical educators can potentially decrease the incidence of childhood obesity in the United States (NCHS, 2010), and physical activity can help alleviate childhood obesity and related diseases (Byberg et al., 2009; Leitzmann et al., 2007). In addition, physical educators are also responsible for developing physical skills beyond being physically active. For example, in a recent prospective study, the researchers investigated the fitness levels of high school students 11 years after having been tested for fundamental motor and sport-based skills (Vlahov, Baghurst, & Mwavita, 2014). They found that high levels of motor skill proficiency in preschool, particularly sport-based skills, were significant predictors of high levels

of fitness later in life. Therefore, physical educators have a unique opportunity to develop skills in children that lead to physical activity and fitness.

School-based programs that are focused on food choices and physical activity provide an ideal locale to try and alter the rise in childhood obesity (Pyle et al., 2006). This includes addressing nutrition, screening, and physical activity in the schools. In addressing nutrition, school administrators have investigated meal options provided to students and the offerings of vending machines in the schools (Horridge, 2008; Millimet, Tchernis, & Husain, 2010). Screening involves measuring students for height and weight and informing parents of the results (McMurtry & Jelalian, 2010), although whether this information translates into meaningful information and change is unclear. By addressing the area of physical activity, school officials give children the opportunity to be more active in a structured environment (Harris, Kuramoto, Schulzer, & Retallack, 2009; Stork & Sanders, 2008), yet questions remain regarding the type and intensity of physical activity and how to overcome the potential barriers to participation. Thus, research into the association between the prevalence of childhood obesity and school PE programs is important and needed (Levy et al., 2009).

NASPE Standards

Although all 50 states list PE as a school requirement to graduate, unclear language regarding requirements makes enforcement for educational leaders difficult (Levy et al., 2009). Only 13 states (Arizona, Arkansas, California, Delaware, Florida, Kentucky, Louisiana, New Mexico, North Carolina, Oklahoma, South Carolina, Virginia, and Washington) wrote the policies in a way that could be enforced (Levy et al., 2009). Although the National Association for Sport and Physical Education (NASPE, 2009) provides standards recommended for inclusion in each state's health and PE curriculum, not all states and programs require adherence.

NASPE (2009) created six national standards of PE. These standards were recently modified (Society of Health and Physical Educators America, 2014), and therefore, standard numbers used in the basis for this study do not match those currently available in some material (but match those in others). These standards were designed to provide a framework for quality PE. Although all six standards are important, three directly relate to physical activity and skills that combat childhood obesity. Standard 1 expects students in PE

to demonstrate competency in motor skills and movement patterns, Standard 3 requires students to participate regularly in physical activity, and Standard 4 requires students to achieve and maintain a health-enhancing level of physical fitness. All have been found to influence levels of childhood obesity (e.g., Barlow, 2007; Cliff et al., 2010; Kilding, Wagenaar, Cronin, McGulgan, & Schofield, 2009; Reilly, Kelly, & Wilson, 2010; Zecevic, Tremblay, Lovsin, & Michel, 2010).

By investigating the incorporation of these standards in PE curricula and classroom decisions, we looked at the possible affects physical educators could have on the prevalence of childhood obesity. The purpose of this study was to determine how much physical educators perceive they incorporate elements of the three NASPE (2009) standards for PE that directly address obesity in their curriculum and classroom decisions. It was guided by one overarching research question: How much time, if at all, are elements of NASPE Standards 1, 3, and 4 incorporated into PE curricula?

Method

Participants

To determine the appropriate sample size for the study, a power analysis was conducted with a medium effect size of .30, an alpha level of .05, and an accepted power of .80 (Creswell, 2008). Analysis using G*Power 3.1.2 resulted in a desired sample size of 82. Participants ($N = 101$; 58 male, 43 female) were a convenience sample of physical educators in the public school systems from eight states including Arizona ($n = 38$), Arkansas ($n = 6$), California ($n = 22$), Georgia ($n = 15$), Michigan ($n = 2$), Minnesota ($n = 8$), Oregon ($n = 7$), and Utah ($n = 3$). Participants' status as physical educators was established individually by state as each state has varying requirements for teacher certification. Because private and parochial schools are not required to abide by state standards, no physical educators from these schools were included in the study. Physical educators were chosen because these individuals are directly responsible for the incorporation and use of the NASPE standards in health and PE classrooms.

Instruments

The survey instrument was designed specifically for this study. Prior to the decision to self-develop the survey instrument, an exhaustive search for commercially available surveys was completed,

and none were found. In addition to demographic questions ascertaining gender, number of years teaching, grade level taught, and location (state), the survey contained 15 randomly ordered Likert-type statements in which participants were asked to rate their level of agreement from 1 = *never* to 5 = *always*. These statements were developed specifically based on the three NASPE standards being investigated, and there were five survey questions per standard. These questions were framed in terms of time spent in specific areas, and example questions included “How often, if at all, did you teach specific motor skills?” and “How often, if at all, did you assess the students’ levels of fitness?”

Statements were developed from key words or phrases that were repeated in the descriptions of the standards. For the first NASPE standard, five key phrases or words were identified: (a) movement fundamentals, (b) combining skills, (c) balancing skills, (d) carrying and lifting techniques, and (e) motor skills. This process was repeated for the third NASPE standard, and five key phrases were identified: (a) time management, (b) time spent in physical activity, (c) fitness tests, (d) goal setting, and (e) enjoyment. Key phrases identified from the fourth NASPE standard included (a) identifying levels of physical activity (i.e., light, moderate, or vigorous), (b) levels of fitness, (c) health-related recommendations, (d) physical activity indicators, and (e) improving fitness levels.

Validity of this survey followed several steps. After a broad search to locate an equitable survey, items were developed and evaluated by three university professionals to provide content feedback to aid in construct validity. These recommendations were adopted in the final survey instrument. Following these changes, further validity of the survey was acquired through a pilot study, wherein the survey was sent out to 10 eligible physical educators from a state not included in the data collection for feedback regarding content, wording, and formatting to ensure the survey was formatted and presented correctly and the content could be understood by the target population. Minor grammatical edits were made, and one statement was modified to include examples associated with the statement, but the overall structure and wording of the survey remained unchanged.

Procedure

Following university ethics approval, a school district was randomly targeted from the identified states and the superintendent for each district was contacted to obtain written approval and permis-

sion to conduct the study within that district. District representatives provided the contact information for health and physical educators within the districts that consented to the study.

The request for participation occurred in two ways. The first method was through direct e-mail between the online survey website and potential participants. These participants were sent an e-mail containing an explanation of the study and a link to the Web-based survey. Reminder e-mails were sent at time intervals of 2 weeks, 3 weeks, and 4 weeks after the initial e-mail. Two of the school districts sent the survey via Web link to the potential participants, stating that the response rate would be increased and that they did not want to release the contact information of the health and physical educators. Thus, these potential participants could not be sent reminder e-mails. The survey remained available for 1 month.

Data Analysis

Data were categorized into independent and dependent variables. The independent variables included gender, years teaching, grades taught, class time, and whether PE was mandated by state law. The dependent variables included the items evaluated for teacher adherence to addressing the NASPE standards. The data were analyzed via Pearson product-moment correlation coefficient (r) to determine the presence of a relationship between each independent and dependent variable. Alpha level was set at .05.

Results

Almost one quarter (22.8%) of participants had between 1 and 5 years teaching experience, 32.7% between 5 and 10, 14.9% between 10 and 15, 6.9% between 16 and 20, and 22.8% more than 20. Participants were asked to indicate the primary grades taught, whereby 39.6%, 29.7%, and 30.7% taught K-5, 6-8, and 9-12, respectively. When asked if PE was state mandated, 73% indicated that it was. Time spent with each class per week measured in hours ranged between less than 1 hr (15.8%), 1-2 (27.7%), 2-3 (9.9%), 3-4 (6.9%), 4-5 (26.7%), and more than 5 (12.9%).

Correlations between teacher gender and the dependent variables were not significant. Table 1 shows the means and standard deviations of each independent and dependent variable as well as the r value of each correlation. The null hypothesis was that each relationship would be $r = .00$. Assumption of independence was met via random selection, and the assumption of linearity was met via a scatterplot review of the variables.

Table 1

Means, Standard Deviations, Correlation Coefficients, and p Values of Independent and Dependent Variables

Standard, <i>M (SD)</i>	Gender	Years teaching	Grades taught	Time with class	State mandated
		2.74 (1.47) ^a	2.75 (1.06) ^b	3.40 (1.76) ^c	1.27 (.44) ^d
NASPE Standard 1					
Movement Fundamentals, 3.78 (.99) ^e	<i>r</i> = .06 <i>p</i> = .57	<i>r</i> = -.23 <i>p</i> = .02*	<i>r</i> = -.28 <i>p</i> = .01**	<i>r</i> = -.34 <i>p</i> = .01**	<i>r</i> = .11 <i>p</i> = .27
Combining Skills, 3.28 (1.03)	<i>r</i> = .07 <i>p</i> = .50	<i>r</i> = -.24 <i>p</i> = .02*	<i>r</i> = -.18 <i>p</i> = .07	<i>r</i> = -.27 <i>p</i> = .01**	<i>r</i> = .06 <i>p</i> = .59
Balancing Skills, 2.88 (.96)	<i>r</i> = -.01 <i>p</i> = .89	<i>r</i> = -.19 <i>p</i> = .06	<i>r</i> = -.26 <i>p</i> = .01**	<i>r</i> = -.26 <i>p</i> = .01**	<i>r</i> = -.04 <i>p</i> = .68
Carrying/Lifting Techniques, 2.59 (1.20)	<i>r</i> = .04 <i>p</i> = .71	<i>r</i> = .14 <i>p</i> = .17	<i>r</i> = .34 <i>p</i> = .01**	<i>r</i> = .29 <i>p</i> = .01**	<i>r</i> = -.06 <i>p</i> = .57
Motor Skills, 3.87 (1.02)	<i>r</i> = .03 <i>p</i> = .88	<i>r</i> = -.14 <i>p</i> = .16	<i>r</i> = -.28 <i>p</i> = .01**	<i>r</i> = -.38 <i>p</i> = .01**	<i>r</i> = .14 <i>p</i> = .15

Table 1 (cont.)

Standard, <i>M (SD)</i>	Gender	Years teaching	Grades taught	Time with class	State mandated
NASPE Standard 3					
Time Management, 2.71 (1.07)	$r = -.20$ $p = .84$	$r = .07$ $p = .47$	$r = .15$ $p = .14$	$r = .17$ $p = .09$	$r = -.15$ $p = .13$
Time Spent in Physical Activity, 2.57 (1.00)	$r = -.16$ $p = .12$	$r = .11$ $p = .28$	$r = .01$ $p = .90$	$r = -.10$ $p = .31$	$r = -.24$ $p = .02^*$
Fitness Tests, 3.19 (1.14)	$r = .8$ $p = .43$	$r = -.05$ $p = .59$	$r = .01$ $p = .90$	$r = .02$ $p = .85$	$r = -.06$ $p = .55$
Goal Setting, 3.43 (.93)	$r = .02$ $p = .86$	$r = -.01$ $p = .95$	$r = .09$ $p = .33$	$r = .07$ $p = .46$	$r = -.21$ $p = .04^*$
Enjoyment, 3.50 (1.08)	$r = .12$ $p = .22$	$r = -.06$ $p = .53$	$r = -.28$ $p = .01^{**}$	$r = -.25$ $p = .01$	$r = .01$ $p = .90$

Table 1 (cont.)

Standard, <i>M (SD)</i>	Gender	Years teaching	Grades taught	Time with class	State mandated
NASPE Standard 4					
Levels of Physical Activity, 3.51 (.93)	$r = .16$ $p = .12$	$r = -.16$ $p = .10$	$r = -.12$ $p = .25$	$r = -.14$ $p = .18$	$r = .08$ $p = .43$
Levels of Fitness, 3.63 (.90)	$r = .14$ $p = .15$	$r = .01$ $p = .91$	$r = -.23$ $p = .82$	$r = .08$ $p = .43$	$r = -.78$ $p = .44$
Health-Related Suggestions, 3.69 (.85)	$r = .94$ $p = .67$	$r = -.02$ $p = .88$	$r = .06$ $p = .56$	$r = .10$ $p = .34$	$r = .01$ $p = .94$
PA Indicators, 3.47 (.99)	$r = .02$ $p = .83$	$r = -.05$ $p = .64$	$r = -.17$ $p = .10$	$r = -.10$ $p = .31$	$r = .12$ $p = .22$
Improving Fitness Levels, 3.87 (.96)	$r = -.00$ $p = .97$	$r = .15$ $p = .14$	$r = -.12$ $p = .91$	$r = .02$ $p = .85$	$r = -.06$ $p = .56$

^aMean years teaching was between 6 and 15 years. ^bMean grades taught were between third and eighth grade. ^cMean hours per week with PE classes was 6–12 hr per week. ^dPhysical education was mandated in 73% of teachers who completed the survey. ^eMeans and standard deviations of Likert scored items. Range: 1 = *Never addressed the standard* to 5 = *Always addressed the standard*.

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

Standard 1

Significant inverse correlations were observed between years teaching and movement fundamentals ($r = -.23, n = 105, p = .02$) and combining skills ($r = -.24, n = 105, p = .02$). More experienced PE teachers spent less instructional time on movement fundamentals and combining skills than did less experienced teachers.

There were significant positive and inverse correlations between grades taught and movement fundamentals ($r = -.28, n = 105, p < .01$), balancing skills ($r = -.26, n = 105, p < .01$), carrying and lifting techniques ($r = .34, n = 105, p < .01$), and motor skills ($r = -.28, n = 105, p < .01$). Therefore, PE teachers in higher grade levels spent less instructional time teaching movement fundamentals, balancing skills, carrying and lifting techniques, and motor skills.

Significant positive and inverse correlations were observed between time with PE class and each NASPE Standard 1 item including movement fundamentals ($r = -.34, n = 105, p < .01$), combining skills ($r = -.27, n = 105, p < .01$), balancing skills ($r = -.26, n = 105, p < .01$), carrying and lifting techniques ($r = .29, n = 105, p < .01$), and motor skills ($r = -.38, p < .01$). Thus, a greater time spent in PE class resulted in a decrease in instructional time spent on increasing fundamental movement skills, combining skills, balancing skills, carrying, and motor skill development. A greater time spent in PE class resulted in greater instructional time spent on teaching lifting techniques. No significant relationships were observed between state-mandated PE and each of the NASPE Standard 1 items.

Standard 3

Three significant relationships were observed within NASPE Standard 3 and each of the independent variables. Physical educators assessed student enjoyment significantly less in higher grades than in lower grades ($r = -.28, n = 105, p < .01$). Furthermore, less time was spent in physical activity ($r = -.24, p = .02$) and on goal setting ($r = -.21, p = .04$) among PE classes mandated by public policy.

Standard 4

No significant relationships were found between NASPE Standard 4 items and each of the independent variables. Thus, no significant differences were found between levels of physical activity, levels of fitness, health-related suggestions, physical activity indica-

tors, and improving fitness levels when compared with participant gender, years teaching, grades taught, time with class, and whether PE was state mandated ($p > .05$).

Discussion

This study was conducted to determine the frequency that physical educators use recommended national standards that are specifically focused on physical fitness and activity in their classroom. This is important as understanding whether physical educators are adhering to standards could impact the obesity levels and general health and well-being of children.

Childhood obesity is complex with a myriad of possible causes including genetics (Dina et al., 2007), environment (Verhulst et al., 2009), food (Kral et al., 2008), economics (Cawley, 2010), and lifestyle (Epstein et al., 2008). Potential solutions to address this epidemic include medical professional support (Vaughn & Waldrop, 2007), familial units (Wen et al., 2007), public policies (Pinzon-Peréz & Mountcastle, 2010), community programs (Coleman, Geller, Rosenkranz, & Dzewaltowski, 2008), and school-based programs (Pyle et al., 2006). With regular contact with children, teachers and physical educators in particular have a unique opportunity to educate and change unhealthy behaviors by instructing children how to live healthily throughout all phases of life (Sergiovanni, 2007). However, there is little research to determine if or how physical educators use standards within their curriculum to combat childhood obesity.

Standard 1 expects PE students to demonstrate competency in motor skills and movement patterns, and our findings yielded several areas of discussion. First, we found that the more time a student spent in PE, the less instructional time was dedicated to motor skill development. It is not surprising that PE teachers in higher grade levels spent less instructional time teaching fundamental movement skills. High school curricula are more likely to be focused on other areas such as strategies, for example. However, fundamental movement skills are the foundation to successful movement and coordination (Lloyd, Saunders, Bremer, & Tremblay, 2014), and the increased time “lifting” indicates that perhaps PE teachers are focusing more on fitness-based activities. This could have potentially deleterious consequences as higher levels of motor skills have been shown to predict higher levels of fitness (Barnett, van Beurden, Morgan, Brooks, & Beard, 2008).

Standard 3 intends for students to develop habitual patterns of regular participation in meaningful physical activity (NASPE, 2009). This standard is perhaps the most significant of all of the standards because it is within the setting of physical activity participation that children apply, practice, and refine fundamental motor skills. In addition, the positive health and academic benefits associated with children's regular physical activity participation are well known. There was an inverse relationship between time spent in physical activity and state-mandated PE, such that students in state-mandated programs received less physical activity time than students without a state mandate. Bias (2010) reported that the majority of superintendents polled thought that PE programs within their jurisdiction were meeting NASPE standards. However, Benham-Deal, Jenkins, Wallhead, and Byra (2007) reported that teachers found that state mandates can negatively affect their program; in the present study, state mandates appear to limit how much physical activity is occurring in schools.

It is concerning that PE teachers assessed student enjoyment less in higher grades than in lower grades; without additional data, it is unclear why. Because a lack of fun is a primary reason children quit sports ("Why Kids Quit Sports," 2001), PE teachers, irrespective of level, should be cognizant of whether their classes are not only beneficial, but also fun, which can positively influence exercise outcomes and attitudes toward physical activity (Zan & Ping, 2014). Teaching a student that physical activity and exercise is not fun is likely to result in less desire to engage in these activities as an adult (Ryan & Deci, 2000).

Standard 4 requires students to achieve and maintain a health-enhancing level of physical fitness. It is understandably difficult for physical educators to believe they are impacting physical fitness levels if PE is not provided on a regular basis. For example, Benham-Deal et al. (2007) reported that a lack of time was a significant barrier to meeting state standards. Weiyun (2006) also found that teacher personal commitment, active participation in professional development, and understanding the standards influenced teachers' knowledge and views of national standards.

Limitations and Future Research

This study should be considered in light of several limitations that provide opportunities for future research. First, although statistically ample, participant sample size was small considering the

number of physical educators in the United States. Researchers should consider expanding the pool to determine if differences vary by state. Second, not all NASPE standards were assessed, in part to keep the survey of a manageable length and focus specifically on obesity-related standards. Researchers may wish to examine adherence to these standards through a qualitative method to gain a richer, deeper understanding of how and why NASPE standards are or are not used. Finally, this survey was designed specifically for this study and needs further analysis with additional groups to determine its reliability and validity.

Conclusions

Educational leaders rely on research to support changes to current health and PE standards, public policy, and legislation. Story, Nanney, and Schwartz (2009) stated that physical activity can be added to the school curriculum without academic consequences, but a scientific basis through research must exist to create a sound rationale for these additions. As Richards and Wilson (2012) so eloquently stated, to advocate one must have something worth advocating. Our findings suggest that physical educators can do more to meet current NASPE standards. However, perhaps more concerning is the limited contact time between the physical educator and student; over 40% of participants had 2 or less hours of contact time per week. Thus, how effective a physical educator can be with such limited time is uncertain. Although physical educators have a unique opportunity to address childhood obesity challenges, they must be provided the time and opportunity to do so.

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TEACHER EDUCATION

Preservice Physical Educators' Perspectives of Sport Education

Alisa R. James, Douglas Collier, Tim Brusseau

Abstract

Although many researchers have investigated sport education (SE) as a curriculum model at different educational levels (Bennett & Hastie, 1997; MacPhail, Gorely, Kirk, & Kinchin, 2008; MacPhail & Kinchin, 2004; Spittle & Byrne, 2009), there has been limited research on preservice physical education (PE) teachers' perceptions of SE. In particular, investigations of preservice PE teachers' perceptions of participating in activity courses in which they used the SE curriculum model are lacking. The purpose of the study was to examine preservice PE teachers' perceptions of an advanced basketball class that was taught by a novice instructor using the SE curriculum model. Participants included 38 preservice PE teacher education students enrolled in an advanced basketball class and their instructor. Data were collected through formal interviews with 10 preservice PE teachers (seven males, three females) and the course instructor. In addition, document data in the form of lectures given by the instructor, written assessments, sample practice plans, course syllabi, course outline, and grading plan were also collected. Data were analyzed by developing categories and examining them for common elements that ran throughout and tied them together. Themes were then extracted from these categories. Data were then selectively coded for examples that illustrated the themes.

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Three main findings were drawn from the analysis. First, the results indicate that students were empowered in the class because they directed their learning and believed that using SE would benefit them when they became inservice teachers. Second, there was a great deal of formal accountability embedded in the class, and although students were informed that they would be evaluated on their performance, they believed that effort would count more toward their final grade in the class. Third, the preservice PE teachers perceived that basketball taught with the SE model was meaningful in that it was enjoyable and they learned more about the game in contrast to their lack of learning in their high school PE experiences playing basketball.

Sport education (SE) is a curriculum model that has received a great deal of attention in physical education (PE) with the goal being to create competent, literate, and enthusiastic sportspeople (Siedentop, 1994). The model simulates the features of an authentic sport season including team affiliation, formal competition, record keeping, a complete season (20 or more lessons), festivity, and a culminating event (Siedentop, Hastie, & van der Mars, 2011). As SE curriculum is different from what most students experience in a traditional PE class during which the structure and sequence of activities is the same (i.e., tasks that are focused on skill development with or without game play). Over the past two decades, there has been a great deal of interest in SE on the part of PE teachers and researchers. Resultantly, researchers have investigated the efficacy of SE in PE at all educational levels (Bennett & Hastie, 1997; Carlson & Hastie, 1997; Cruz, 2008; Hastie, 1998a, 1998b, 2000; Hastie & Curtner-Smith, 2006; Hastie & Trost, 2002; MacPhail et al., 2008; MacPhail & Kinchin, 2004; MacPhail, Kinchin, & Kirk, 2003; Pritchard, Hawkins, Wiegand, & Metzler, 2008; Spittle & Byrne, 2009).

The results of these studies indicate that SE as a curricular model has yielded several positive outcomes. For example, this approach enhanced student enjoyment and participation (Bennett & Hastie, 1997; Hastie, 2000; MacPhail et al., 2008; MacPhail & Kinchin, 2004). It increased opportunities for social development (Carlson & Hastie, 1997; Hastie & Sharpe, 1999; Pope & Grant, 1996) and affected skill and tactical development (Clarke & Quill, 2003; Hastie, 1998b; Hastie & Curtner-Smith, 2006; Hastie, Sinelnikov, & Guarino, 2009; Hastie & Trost, 2002).

Recently, there have been calls to investigate how SE is being used in a physical education teacher education (PETE) program. Typically, in PETE programs, content and pedagogy are taught separately; however, it has been recommended that PETE program faculty teach courses within the curriculum so students are able to make connections between pedagogical knowledge and content knowledge (Jenkins, 2004; Oslin, Collier, & Mitchell, 2001). Along the same lines, there have been recommendations that preservice PE teachers be provided with the opportunity to experience SE as a participant, in such a way that subject matter knowledge can be delivered. Through this process, preservice PE teachers' understanding of the SE model is enhanced (Curtner-Smith & Sofo, 2004; Deenihan & MacPhail, 2013; Gurvitch, Lund, & Metzler, 2008; Jenkins, 2004; Kinchin, Penney, & Clarke, 2005; Oslin et al., 2001). Researchers have investigated preservice PE teachers' perceptions of teaching with the SE model (Curtner-Smith & Sofo, 2004; Deenihan & MacPhail, 2013; McCaughtry, Sofo, Rovegno, & Curtner-Smith, 2004), but the research base is limited with regard to preservice teachers' perceptions of experiencing SE as a participant. Deenihan, McPhail, and Young (2011) investigated the effectiveness of including SE in a PETE program by incorporating the SE model in a 12-week net games module that was focused on tennis, badminton, and volleyball. The results indicate that student participants believed that their experience would have been more meaningful if they had participated in a season consisting of one sport, rather than three. In addition, the instructor did not adhere to the SE model throughout the three activities that made up the season.

It is important to understand PETE candidates' perceptions regarding the effectiveness of SE to gain insight into what attracts them to the model and the likelihood of them using the model as teachers. Relatedly, it is important to understand what features of the SE model are believed to be either valuable or, conversely, problematic. The reasons cited above, coupled with the limited research regarding preservice PE teachers' perceptions of participating in a complete SE season, *warrant* further investigation. Therefore, the purpose of the current investigation was to examine preservice PETE candidates' perceptions of an advanced basketball class that was taught using the SE curriculum model for a complete season.

Method

Setting and Participants

The study was conducted in a comprehensive college located in the northeastern part of the country. The college has a large (over 400 PETE majors) PETE program.

Institutional review board approval was attained to conduct the research. In addition, informed consent to participate from participants was obtained. Pseudonyms have been used throughout this article to protect participants' anonymity.

Participants included 38 preservice PETE students (33 males, five females; 92% Caucasian, 5% African American, 3% Hispanic) who were enrolled in an advanced basketball class. Students in the class had previous experience playing basketball; many of them had played at the varsity level in high school, and others had played in college. The teacher, Mr. Smith, was a Caucasian male graduate teaching assistant. Although Mr. Smith had significant experience teaching and playing basketball at the varsity high school level, he had minimal experience teaching basketball using the SE curriculum model. His experience using the model was through his teaching methods course at the university and during student teaching.

Advanced Basketball Class Structure

The season consisted of 33 days with the class meeting 5 days per week for 7 weeks: 2 hr 15 min on Monday, Wednesday, and Friday and 1 hr on Tuesday and Thursday. The class was originally scheduled to meet for 35 days; however, class did not meet on two of the days because of university events that conflicted with the class schedule. The first three weeks of the season were dedicated to preseason tasks. The first week of class was spent explaining the components of the SE model through lecture and PowerPoint presentations. Through these presentations, students gained an understanding of the importance of team affiliation, formal competition, record keeping, and having a complete season that includes a culminating event and festivity. Students also participated in a skill assessment, learned basketball rules, and learned how to be an effective official. In addition, students learned what was expected when they were performing duty roles when not participating as a player. Students were expected to perform each duty role at least once during the season. The duty roles included officiating, keeping team statistics, score keeping, and managing equipment.

During the first day of the second week, a blind draft took place, at which time the coaches picked their roster. Player choices were based on anonymous rankings that were based on the skill assessment conducted by Mr. Smith. Once teams were selected, each picked a team name and colors as well as created a team cheer or slogan. The remainder of the second week was dedicated to the pre-season. During this time, Mr. Smith lectured about the features of the SE model and ran drills that were focused on skill development and tactical awareness as well as creating situations that allowed students to practice performing duty roles.

The regular season took place during Weeks 3 to 6. Game play took place on Monday, Wednesday, and Friday, and Tuesday and Thursday were dedicated to team practice and no game play. Coaches and players were responsible for creating and executing the practice plans for these days. The last week of the season was dedicated to a postseason tournament. The eight teams participated in a play-off, which led to the championship game on the final day of class. In addition, festivity was added to the season by having an awards ceremony. There were team and individual awards that emphasized hustle, team play, improvement, and attitude.

Data Collection

Data were collected in four ways: (a) demographic data, (b) field notes, (c) two focused formal interviews with 10 randomly selected students and the teacher, and (d) document data.

Demographic data. Demographic data were collected at the beginning of the study. Participants filled out a questionnaire that included questions regarding their year in school, racial and ethnic background, gender, and basketball experience.

Field notes. We conducted observations 15 times over the 33-day season. Field notes were written during and immediately after each observation. Field notes included descriptive and reflective observations for a given lesson.

Interviews. Ten students (seven males, three females) were individually interviewed before and after the season using a semi-structured interview guide. As noted, students were randomly selected for interviews. Sample student interview questions included the following:

- What are your perceptions of the sport education model in this class?

- If you were to use this model as a teacher, how would you use it? Would you do anything differently from what you experienced in the class?

Student interviews lasted between 20 and 30 min and were tape-recorded and transcribed verbatim.

Document data. Document data included lectures and Power-Point presentations given by the instructor, written assessments (in the form of online quizzes), sample practice plans, course syllabi, course outline, and grading plan for the class.

Data Analysis

Data were analyzed throughout the data collection process. Interview transcripts and observational field notes were inductively coded using constant comparative methods (Corbin & Strauss, 2008) to delineate differences and similarities, which were then developed into categories. Once categories were established, themes were identified that cut across several categories. Data were then selectively coded for examples that illustrated the themes (Neuman, 1994).

Data trustworthiness. Data trustworthiness was established in three ways. First, triangulation was used across data sources including field notes, teacher and student interviews, and document data. Second, trustworthiness was fashioned through prolonged and regular engagement between the investigator and the participants. Finally, observations and interview data were examined to identify areas of similarity and dissimilarity between teacher and student perceptions (Merriam, 2001).

Results

The results provide a perspective of how PETE candidates viewed the SE model when used in an advanced basketball class. Results from this study will be presented across three broad themes: (a) students were empowered to take control of their learning, (b) perceptions of formal accountability linked to a grade, and (c) differences between traditional PE and SE.

Students Were Empowered to Take Control of Their Learning

Participants reported that they felt empowered in the advanced basketball class because while using the SE model, they directed their own learning. Participants commented that they appreciated

being able to work with their team and make up their own practice plans. Bert stated, “You get to put together your own practices and make up your own plays. Instead of having the teacher always telling us what to do, we get to do things on our own.” Jose added, “The captains are supposed to keep the practices going, but on my team everybody creates a practice plan for each week. It gives you a chance to set up practices. It gives you experience.” Corey provided further support for the importance of the practice plan. He stated, “The practices were really important for the team because after we lost games, the next day in practice we would work on things that didn’t go well so we would be ready for the next game.” Maria commented that the SE model and working as a team to develop practices enhanced her learning of tactics. Maria stated, “I learned a lot about tactics because a lot of teams were doing defenses that you don’t usually see. Trying to learn those defenses and practice how to beat them was pretty cool.” Document data in the form of practice plans provides further support of students’ comments regarding the importance of completing practice plans. Practice plans were completed with attention to detail in an effort to enhance their team’s level of play.

Participants also noted that taking on the roles associated with SE not only empowered them but also enhanced the teaching–learning environment. Marcus stated,

We had statisticians, scorekeepers, and referees. I think it was good that we had to do all of those things. You get to play games and are an athlete, but then you get to do things you would not think of, like keep track of blocks, turnovers, steals, and fouls. You don’t even think about those things when you play in physical education, but now I have to think about it.

Tricia added, “I really enjoy sport education because while you learn about the game, you also learn how to coach and referee.” Pete commented further, “I like the roles. You don’t think about stuff people do behind the scenes on the shot clock or scoreboard. It expands the class. You are learning other aspects of the game, not just rules.”

Field note data provide further support that students valued the duty roles associated with the SE season in which they were participating. Field note data from Days 18, 19, and 21, which were part

of the regular season, indicate that students were actively participating in the roles of statistician, scorekeeper, official, and equipment manager.

Participants also expressed that they were empowered by the SE model because they now had the skills to use it, as a teacher, in the future. Marcus stated, “Most kids in this class were players before, but when you get out of college and coach, you have to keep stats and referee for little kids, so it is getting me ready for the future.” Mariah noted,

I think the class is great. I have never been exposed to anything like this. I am definitely going to use it when I get out in the field. It is fun and at the same time you are learning. If you mix the fun in with learning, it takes learning to a whole new level.

Perceptions of Formal Accountability Linked to a Grade

This class had a great deal of formal accountability that was linked to a grade. At the beginning of the season, Mr. Smith explained to students that their final grade would be linked to their performance in games and practice.

Mr. Smith commented on how individual statistics would be included in a final grade:

I will have everyone’s statistics in an Excel file. Each statistic is weighted. For example, points scored might be weighted as 1, but a rebound will be weighted at .6. I will rank everyone in the class and based on their ranking, their grade will be determined. They need to play well and get good statistics to receive points toward their final grade.

In addition to performance in games and practices, student performance on quizzes, good sporting behavior, and student performance in duty roles were also part of the final grade. Mr. Smith explained how these aspects would be factored into the grade:

There are a total of six quizzes, two are in the first week and are based on their knowledge and skill of refereeing. I also evaluate their duty roles in terms of doing the duty role as well as equipment and gym set up. Also, I assess sportsmanship and working together.

It was clearly explained in the course syllabus and document data in the form of PowerPoint presentations that the final grade would be based on six knowledge quizzes, graded practice plans, a team assessment of sporting behavior, and individual player statistics (e.g., rebounds, assists, and points scored) that were kept during the season. Furthermore, students were assessed on their knowledge of strategies and rules in the game of basketball through document data in the form of the knowledge quizzes.

Although a great deal of formal accountability was embedded in the class, initially students did not believe that Mr. Smith would hold them formally accountable for their performance in games. For example, Patrick commented, "He is going to look at our stats and in the end that will play a big role. But I am sure that he just watches us and will determine if we are playing hard and breaking a sweat." Maria also believed that effort would count more in her final grade than performance. She stated, "He looks to see how much effort we are putting into practice. We're not really graded on winning and losing. If I miss a shot, it is not going to hurt my grade." Dwayne added, "I don't think, in the end, the stats are part of it. I think he looks for working hard and attendance. He said in the beginning, the better you are, the better in class you will do, but I don't think he meant it."

Patrick did not agree with basing the grade on performance because he believed that some aspects of getting good statistics were out of his control. He stated,

You depend on your team for stats. So if you are handing out assists, you might not even be getting credit for it because they might not be catching it. So it is hard because you are depending on them.

In addition, some participants did not agree with Mr. Smith's grading philosophy and questioned the fairness of the policy. Dwayne commented,

Not everyone is at the same level, but everyone is playing and having a good time. Just because you or someone else might be better than someone else, you want to give them a fair opportunity and not penalize them.

Tricia added,

He watches everyone play, so he knows who the better players are and who the not so good players are. So I would say grading is a little lenient for different people. You don't want to assess someone that is not as good as the best player.

Corey grappled with the grading policy and questioned how Mr. Smith could grade people at different skill levels (i.e., those who were highly skilled compared to those that were lesser skilled but put forth good effort):

It is kind of hard because there are some kids that are really good, but there are some people that try really hard and hustle the entire time, but are not as good as other people. So it is really hard to decide how you are going to give someone an "A" and someone a "B." If someone is really good, you have to give them an "A," because they are doing what the class asks of them. But someone else might not be scoring and aren't as good, but they are trying as hard as they possibly can.

Differences Between Traditional Physical Education and Sport Education

Participants indicated that they enjoyed basketball taught through the SE model and also thought that it was a much better way to teach basketball compared with their high school PE classes. Marcus commented, "In high school, we would just do 'teacher drills.' Here we make out our own plays, run our own practices, and do our own conditioning. Everything is student driven." Field note and document data from Days 1, 2, and 3 of the season indicate that the instruction was primarily teacher directed. However, field notes and document data in the form of practice plans indicate that on several days (7, 9, 11, 13, 17, 20, 22, 25, and 27) students participated in practices that were designed by the coaches and players on individual teams. This demonstrates that students assumed progressively more control over practice tasks as the season progressed.

Several students commented that their participation in basketball in high school PE consisted of going through the motions. Mariah stated,

In high school, we just picked five people and played the game. We barely kept score. It was just go through the motions with no structure or responsibility. It was just come in and play. In this class [SE model], I walk out thinking about how I can switch around the offense or defense and how I can get better.

Maria added, “In high school, we would line up and shoot free throws, pick teams, and go. We didn’t keep track of anything, and next class we would repick teams and play a different game. We didn’t learn any tactics at all in high school.” Marcus commented further, “High school is not even the same class. In high school, they just roll the balls out. There was a time we would play seven versus seven just to get everybody to play. No set up, just a huge mess.”

Participants in the SE class believed that the tasks had meaning and that they learned something, whereas in high school PE, they did not. Dwayne stated, “In sport education, the games mean something. In high school, you don’t play games that have a lot of meaning. It is simply pick-up basketball.” Tricia added,

You learn more with sport education. In high school, you play and learn the basics. With sport education, you are learning different views, like refereeing and the rules in more depth. It is a lot more hands on. If you do your work and pay attention to the quizzes, you will learn a lot.

Dwayne added,

In high school, you walk out of physical education and do not get anything from it, but maybe some exercise. You would not leave class thinking that you actually learned something. I think the way Mr. Smith has set it up is awesome and I have learned stuff.

Each participant interviewed indicated that they enjoyed participating in basketball taught with the SE model, with most noting that it was different from their experiences in high school PE. The results indicate that the students valued the model because of the learning that took place within a supportive and enjoyable learning environment.

Discussion

In this study, participants clearly indicated that they enjoyed and benefited from their experience in the advanced basketball class taught through the SE model. In all cases, they indicated that subsequent to the SE basketball season, they had greater knowledge and a better understanding of the SE model. In addition, participants indicated that they found basketball taught through this approach to be more meaningful than what they experienced during high school PE because they learned more about the game with respect to tactics and the roles associated with the sport of basketball (i.e., coaching, officiating, keeping statistics). In addition, results from the current study indicate that students were empowered through participating in the SE model because they had more control over their participation during the season and participated fully through their involvement in team and duty roles. The results further indicate that participants learned more about strategies and tactics because they had control over the practices and worked on weaknesses in practice that had been identified during game play. In essence, participants acquired an appreciation of the model and expressed that they believed that the model would be of value to them as PE teachers.

Many students commented that they favored basketball taught with the SE model because of the features of the model. These features include a long season, being affiliated with the same team over the course of the season, participating in duty roles, and an appropriate amount of time for practice and game play. It appears that focusing on a single sport for an entire season (33 days) allowed the participants to experience the SE model and develop greater knowledge of the model. We believe that this extended time frame also yielded positive results with regard to student engagement as well as their perceptions of the experience.

This finding supports the importance of using the SE model in the way it was intended, rather than selecting certain features of the model and ignoring others. For example, in the current study, the season was 33 days long and all of the features of the SE model were incorporated. This is in contrast to Deenihan et al. (2011), who investigated preservice PE students' perceptions of an SE season that included three sports. The results from this study indicate that the participants believed that they would have benefited from fewer activities in a single season. Because of the inclusion of multiple sports in one season, they felt rushed while participating in the ac-

tivities and thus lacked time to focus on the novel features of the SE model.

Another difference between the current study and Deenihan et al.'s (2011) is that Mr. Smith, the teacher, designed the season to incorporate all of the features of SE so participants could experience and focus on those features. Although the instructor in Deenihan et al. *intended* to teach three activities using the SE model, the instructor moved away from using SE as the season progressed. In fact, the instructor began to focus on improving the preservice teachers' ability to teach skills rather than experience all of the features of the SE model. As a result, students experienced a somewhat decreased awareness of SE. As the study progressed, they experienced more teacher-directed instruction because the instructor failed to maintain a focus on the different features of an SE season.

The results also indicate that although formal accountability was embedded in the model, many participants did not believe that their individual performance in games and practice would be tied to their final grade. It appears that although these preservice PETE candidates were told that their grade would be linked to their performance, their previous experiences in PE had socialized them to believe that grading based on performance was not done in PE, nor was it appropriate. Many participants commented that they thought they were going to be graded on effort, participation, and attendance, not performance. These preservice PETE candidates had been socialized through what Lortie (1975) referred to as the apprenticeship of observation. These participants had spent their entire K–12 education observing PE teachers doing their job, which did not include basing a significant percentage of their grade on performance. The apprenticeship of observation that was experienced by the PETE candidates in this study led them to develop the belief that it is not an appropriate practice nor fair to grade students based on performance in PE. The beliefs of PETE candidates regarding grading based on performance needs to be addressed in PETE programs. In PE, the performance grade exchange has historically been based on what Placek (1983) referred to as “busy, happy, good,” (p. 54) and this only further marginalizes PE and relegates it to a “non-essential” subject. In addition, this grading philosophy has shaped the beliefs of several PETE candidates, and if not addressed as part of their preservice education, it may lead them to continue this inappropriate approach to the performance grade exchange in PE.

The results indicate that participants believed that basketball taught with the SE curriculum model was much better than their experience with basketball in high school PE. In light of this, it is important that PE teacher educators work to expose PETE candidates to teaching models and methods that are more effective than the manner in which they experienced PE as a student. SE may be a curriculum model that alters the beliefs of PETE candidates, especially because the pedagogy that is employed in SE is drawn from sporting experiences. In addition, the model may be appealing to PETE candidates who have a strong coaching orientation because SE is a form of PE that aligns with their desire to coach (Curtner-Smith & Sofu, 2004; Stran & Curtner-Smith, 2009).

Limitations and Future Research

This research provides a snapshot of PETE candidates' perceptions of SE, but further investigation into this model is warranted. It is important to note the limitations regarding the current study. The use of one class in one university limits the generalizability of the work. The instructor, although carefully trained in the use of the SE model, did not have significant experience implementing the model. However, our observations indicate that the model was implemented with considerable skill. Researchers could examine PETE candidates' perceptions of SE in other sporting activities, such as racquet sports or track and field. In addition, teacher candidates' perceptions of SE in activities other than competitive team and individual sports such as canoeing and hiking could be explored. A mixed methods or quantitative analysis could be used to examine the qualitative findings of this study. Last, replicating and/or extending this examination of PETE students' perceptions of participating in activities taught with the SE model to multiple universities located in different geographic locales is essential to generalizing these findings.

Conclusions

Using SE to teach activity classes in which PETE candidates learn skills, tactics, and duty roles associated with a specific activity over the course of a season enhances student learning and makes the experience particularly meaningful. In addition, it serves as a vehicle to challenge PETE candidates' beliefs about teaching PE, beliefs that have been shaped and formed through their apprenticeship of observation during the K–12 PE experience. In addition, because the model's structure appeals to many PE teacher candidates

based on their previous experiences with sport, it may lead those with more of a coaching orientation to teach effectively with the model and not simply “roll out the ball,” a practice which is, unfortunately, still prevalent in PE.

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TEACHER EDUCATION

Relationship Between Teacher Fidelity and Physical Education Student Outcomes

Jerry W. Loflin

Abstract

To evaluate the influence of scientifically based curricula intended for the physical education (PE) classroom, researchers should consider fidelity, or the extent to which teachers who are implementing a PE curricular intervention adhere to the model of curriculum and instruction inherent in the research design. The purpose of this study was to assess PE teachers' fidelity of implementation as they implemented a research-based PE curricular intervention and to examine the relationship between teachers' fidelity to the curricular intervention and student outcomes. Six teachers from three middle schools taught one 20-lesson unit from a PE intervention to their sixth grade students. Teachers' fidelity of implementation was documented using nonparticipatory observations. Students' knowledge acquisition was measured on a standardized knowledge test prior to and after the 20-lesson unit. Students' physical activity intensity levels were measured on lesson observation days using accelerometers. Multiple regression with fidelity score as the predictor

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and knowledge acquisition as the criterion variable indicated that teachers' fidelity scores accounted for a large portion of variance in student knowledge growth ($R^2 = .79$, $\text{adj } R^2 = .74$, $p < .05$). Approximately 48% of all observed lesson time involved moderate to vigorous physical activities. Based on the findings from this research, it appears the more faithful teachers are to teaching research-based curricula as designed, the greater the impact the curricula can have on student achievement.

During a time of student, teacher, and school accountability, state legislators are taking control of schools through legislative actions across the United States. Educational mandates and policies related to school vouchers, school performance pay, teacher licensure, and testing legislation have been popular talking points among many legislators despite resistance and criticism from members of the education community. These reforms, along with legislation directed toward specific content areas such as PE, have redefined the way teachers teach and students learn.

As educational practices continue to receive strong criticisms, researchers are increasingly concentrating on the influence of scientifically based curricula and teaching methods on student outcomes. The need to attend to research-based practices also extends to the field of PE. Research should be directed toward understanding and measuring classroom environments in which PE students move and learn, as well as the educational practices to which students best respond based on their learning characteristics (Sallis et al., 2012).

To evaluate the influence of scientifically based curricula intended for the PE classroom, researchers should consider fidelity, or the extent to which teachers who are implementing a PE curricular intervention adhere to the model of curriculum and instruction inherent in the research design (Lillehoj, Griffin, & Spoth, 2004; Lynch & O'Donnell, 2005). Logically, if teachers do not implement research-based curricular interventions as designed, measured outcomes may not be attributable to the effectiveness of the intervention. However, in few studies have researchers measured fidelity of implementation (FOI), or "the extent to which delivery of an intervention adheres to the protocol or program model originally developed" (Mowbray, Holter, Teague, & Bybee, 2003, p. 315).

The purpose of this study was twofold. First, I assessed PE teachers' FOI as they implemented a research-based PE curricular intervention. Second, I examined the relationship between teach-

ers' fidelity to the curricular intervention and student outcomes. I was guided by two research questions: (a) To what extent do teachers implement lessons from a sixth grade PE curricular intervention with fidelity, and (b) what is the relationship between FOI and student outcomes (i.e., knowledge gain and physical activity intensity levels)?

Assessing FOI increases researchers' and practitioners' understanding of the fit between the intervention and the context. However, the complexity of the implementation context can affect the efficiency and generalizability of the innovation to other situations. Researchers have rarely used fidelity variables to explain intervention outcomes. Appropriate and accurate fidelity data can inform research and practice to better explain intervention outcomes.

During a time of teacher and student accountability, high-stakes testing, and No Child Left Behind mandates, schools and students must have effective curricula to increase achievement outcomes. Furthermore, given the calls by public health organizations to increase physical activity and decrease overweight and obesity levels in children and adolescents, school-based PE programs need evidence-based interventions proven to increase educational achievement and/or physical activity outcomes. Measuring FOI provides one method of assessing moderators of curricular effectiveness. According to O'Donnell (2008), there is need to conduct research on FOI and to understand why and how teachers impact intervention implementation. Studying FOI as part of curricular effectiveness research is critical to understanding intervention success or failure. Valid measures of FOI also can enhance statistical power and explain variance in outcome studies. In this research, I examined variables that enhanced or constrained the effectiveness of a large-scale PE intervention and the influence of FOI on student outcomes.

Fidelity of Implementation

Educators are increasingly expected to use an assortment of instructional and curricular approaches to address the diverse needs of students and improve student achievement. The No Child Left Behind Act of 2001 (NCLB, 2003) states that educators must use scientifically based teaching methods and strategies proven to be effective. Therefore, researchers and educators should be concerned about the degree to which the educational interventions they design, implement, and adopt are evidence based (Lynch & O'Donnell, 2005; Mowbray et al., 2003; Slavin, 2003).

To determine the effectiveness and impact of a research-based curricular intervention, it is important to assess the degree to which its implementation adheres to the model of curriculum and instruction inherent in the research design (O'Donnell, 2008). Although there are many competing definitions, I broadly define FOI "as the extent to which delivery of an intervention adheres to the protocol or program model originally developed" (Mowbray et al., 2003, p. 315). Assessing FOI in the context of any intervention study is essential because "failure to establish fidelity can severely limit the conclusions that can be drawn from any outcome evaluation" (Dumas, Lynch, Laughlin, Smith, & Prinz, 2001, p. 39).

In studies assessing FOI, empirical evidence indicates significant correlations between the extent to which intervention studies are implemented with fidelity and the level of treatment outcomes (Blakely et al., 1987; Dane & Schneider, 1998; Ruiz-Primo, 2006). Although most of these studies have taken place in the context of public health and counseling research (O'Donnell, 2008), the number of FOI studies in which the effectiveness of K–12 curricular interventions has been evaluated is increasing (Lillehoj et al., 2004; Lynch & O'Donnell, 2005; O'Donnell, 2008). For evaluation of teacher fidelity in the context of such research-based curricula, a five-component FOI framework has been proposed to include adherence, coverage, program differentiation, delivery quality, and participant responsiveness (Lynch & O'Donnell, 2005; O'Donnell, 2008). Given the "...compelling need to better understand how curricula, instruction, and student diversity affect student achievement in K–12 classrooms" (Lynch & O'Donnell, 2005, p. 2), fidelity studies in which K–12 curricular intervention effectiveness has been investigated deserve consideration and have been recommended (O'Donnell, 2008).

Notably, to assess FOI, it is not necessary to evaluate all five components. Researchers should attend to components that are of interest to their study (Lillehoj et al., 2004; Lynch & O'Donnell, 2005), and few researchers have reported measuring all five. For example, Lynch and O'Donnell (2005) monitored adherence, delivery quality, and participant responsiveness in evaluating teacher fidelity during the implementation of a research-based middle school science curriculum. Similarly, Lillehoj et al. (2004) focused on adherence and delivery quality while assessing fidelity in the context of a middle school problem behaviors study. For purposes of this study, the fidelity components of adherence, coverage, and delivery quality were of primary interest.

Science of Healthful Living Project

I implemented this study as a part of and during the second year of the larger 5-year Science of Healthful Living (SHL) project conducted by the University of North Carolina at Greensboro with support provided by the National Institutes of Health (NIH). The goal of the SHL project was to design and evaluate a science-based middle school *SHL* curriculum to increase students' cognitive knowledge and interest in health-related science, increase their intention to pursue a life science-related career, and improve their family members' understanding of NIH-funded clinical and basic research results. For the SHL project, a health-related science-based curriculum was designed for middle school PE. The curriculum consists of two 20-lesson units, Cardio Fitness Club and Healthy Lifestyles, in which students engage in the scientific inquiry process in PE. Students engage in physically active lessons to examine the effects of exercise and healthy nutrition on their bodies. They explore topics such as the physiology of exercise, food-fueled energy systems, caloric balance, nutrition/portion sizes, and the role of physical activity and nutrition in stress management. The scientific inquiry process is embedded in each lesson using the 5Es (i.e., Engagement, Exploration, Explanation, Elaboration, and Evaluation) learning cycle strategy (Bybee et al., 1989) to help physical educators and students engage in the scientific inquiry process in a hands-on approach to science. Students are afforded opportunities to make predictions about physical activity concepts, test their predictions, and draw conclusions about their predictions in physically active environments. Additional information about the larger SHL project can be found at <http://www.uncg.edu/hhs/science-of-healthful-living>.

During Year 2, the SHL project was set in seven local education agencies in the Piedmont region of North Carolina. Twenty-five middle schools, including five new middle schools recruited in Year 2 of the study, participated in the project, including over 16,000 diverse students and 70 middle school PE teachers. A randomized controlled experimental design was used to stratify the middle schools during Year 1 into matched pairs according to socioeconomic status (derived from free and reduced-price meals school-level data) and scores on end-of-grade tests in mathematics and reading. One school in each pair was randomly assigned to teach the *SHL* curriculum (experimental school) and one school taught the traditional sport-based or multiactivity PE (control school).

Method

Research Design

I used a mixed methods design to collect and analyze quantitative and qualitative data examining FOI in the SHL project (Creswell, 2013; Creswell & Plano Clark, 2011; Tashakkori & Teddlie, 2010). Using multiple data collection strategies provided a more complete analysis than any single method alone could accomplish when addressing the problem (Creswell, 2013; Creswell & Plano Clark, 2011; Tashakkori & Teddlie, 1998, 2010). A mixed methods design was appropriate because FOI measurement and analysis required quantitative and qualitative data collection and analysis during various study stages. Mixed methods approaches offered complementary insights into understanding the faithful implementation of the *SHL* curriculum and the impact FOI had on student outcomes.

Research Sampling

A selective sample of schools was chosen from the 15 schools randomly assigned to implement the *SHL* curriculum. Any experimental school ($n = 15$) that had at least one new SHL teacher during the 2012–2013 school year was considered for the study. Of the 15 schools with teachers new to the project, three schools located in a cluster were selected to facilitate data collection. FOI in each participating sixth grade PE class ($n = 6$) at the three schools was examined in this study.

Research Sites and Participants

Participants were middle school PE teachers and their sixth grade students from Albany, New River, and St. Anthony Middle Schools (pseudonyms). These middle schools were located in the Piedmont region of North Carolina and served students in Grades 6–8, aged 11–14. Each school was selected because the teachers were voluntarily participating in the SHL project effectiveness study for the first time during the 2012–2013 school year. The three schools selected for this research had been randomly assigned to the intervention group. PE teachers taught the *SHL* curriculum consisting of 20 structured lessons from the sixth grade Cardio Fitness Club unit.

Albany Middle School had over 220 sixth grade students enrolled during the 2012–2013 academic year. Approximately 52% of the students were male, 14% were White, 69% were Black, 7% were Hispanic, 6% were Asian, and 73% received free and reduced-price

meals (FARM; Education First NC School Report Cards, 2011). Three middle school PE teachers (one male and two females) were employed at Albany Middle School during the 2012–2013 academic year. Students received gender-segregated PE instruction for the school year on a 1-week PE and 1-week health education rotation. The two female teachers and their three sixth grade classes participated in this study. The two sixth grade PE classes assigned to the same teacher were combined in this study to form one sixth grade PE class.

New River Middle School had over 190 sixth grade students enrolled during the 2012–2013 academic year. Approximately 50% of the students were male, 35% were White, 12% were Black, 48% were Hispanic, and 77% received FARM (Education First NC School Report Cards, 2011). Two middle school PE teachers (one male and one female) were employed at New River Middle School during the 2012–2013 academic year. Students received coeducational PE instruction for one semester using a 4-week PE and 2-week health education rotation. Only the sixth grade students enrolled in three PE classes during the first semester participated in this study. Two of the three PE classes occurred at the same time and place and were team taught. These two classes were combined to form one class and assigned to the lead teacher.

St. Anthony Middle School had over 180 sixth grade students enrolled during the 2012–2013 academic year. Approximately 48% of the students were male, 52% were White, 17% were Black, 25% were Hispanic, and 60% received FARM (Education First NC School Report Cards, 2011). Two middle school PE teachers (one male and one female) were employed at St. Anthony Middle School during the 2012–2013 academic year. Students received coeducational PE instruction for one semester using a 4-week PE and 2-week health education rotation. Only the sixth grade students enrolled in three PE classes during the first semester participated in this study. Two of the three PE classes occurred at the same time and place and were team taught. These two classes were combined to form one class and assigned to the lead teacher.

Data Sources

Lesson observations. I collected detailed field notes for each observed lesson and systematically coded the field notes to examine adherence based on coverage and delivery quality per sixth grade PE class.

Standardized knowledge tests. Student knowledge test gain scores served as one of two intervention outcomes in this study. Sixth grade students receiving the intervention completed a 10-item pre- and postinstruction knowledge test. The two assessments were multiple-choice (four choices) and administered through Qualtrics (Qualtrics Labs, Inc., Provo, UT). The test items for the Cardio Fitness Club unit were created to match the content covered in the unit to increase the content validity of the tests. The pretests were administered during the lesson immediately preceding Lesson 1, and the posttests were administered immediately after Lesson 20.

In-class student physical activity intensity levels. The second outcome variable, student physical activity intensity levels, was measured with Actigraph GT3X+ accelerometers (Actigraph, Pensacola, FL). The GT3X+ accelerometer is a small (4.6 cm × 3.3 cm × 1.5 cm), light (19 g) device contained in a plastic case that participants attach using an adjustable elastic waist strap. The solid state accelerometer can be used to measure and record physical activity vector magnitude counts in three physical axes. In the prefiltered raw mode, accelerometer output represents the actual G-force signal untransformed by a band-pass filter and sampled at a frequency of 30 Hz (John & Freedson, 2012). The G-force signal is then converted by a 12-bit analog-to-digital converter with the output band-pass filtered across a frequency range of 0.25 Hz to 2.5 Hz (John & Freedson, 2012). The filtered signal is then rectified and integrated over a user-specified time frame (i.e., epoch). At the end of each epoch, a vector magnitude count is calculated and stored in memory, the integrator is reset, and the process starts over. The sampling epoch length was set at 10 s for this study.

Intensity levels were categorized as sedentary, light, moderate, vigorous, and very vigorous. Intensity level category cutoff points (sedentary: vector magnitude count < 150; light: 150–499; moderate: 500–3,999; vigorous: 4,000–7,599; very vigorous: > 7,599) categorized by Freedson, Pober, and Janz (2005) determined student physical activity intensity levels (i.e., sedentary, light, moderate, vigorous, or very vigorous) during SHL lessons. The device has demonstrated high interinstrument reliability ($r = .86-.89$) and intrainstrument reliability ($r = .86$; Melanson & Freedson, 1995).

Data Collection

Lesson observations. Once knowledge pretesting was complete at each participating school, participating teachers began teaching

the sixth grade Cardio Fitness Club unit (Lessons 1–20) to their sixth grade students. I began visiting each participating school beginning with Lesson 6 to collect detailed field notes on Lessons 6–20. Observation field notes for Lessons 1–5 were not collected to allow the teachers to become familiar with the lesson format, pacing, and content prior to data collection. Observation field notes were recorded on the standard qualitatively oriented SHL observation form. The SHL observation form was used because it aligned with the general structure of each lesson and facilitated field notes collection. It contained sections for recording the standard school, teacher, grade, period, and date of observation and categories for describing in detail events that occurred during each of the 5Es within the lessons. The categories for the 5Es contained subcategories related to lesson timing, delivery quality, student enjoyment, and student journal use during that section. I observed, in a nonparticipatory capacity, at least 40% of Lessons 6–20 implemented in each sixth grade class. Participating teachers were not informed about when or which lessons I would observe.

Standardized knowledge growth. Depending on school academic calendars and school computer lab availability, participating teachers administered the sixth grade, 10-item standardized knowledge pretest to their sixth grade PE students prior to teaching Cardio Fitness Club Lesson 1. I sent a Qualtrics pretest hyperlink to teachers via e-mail communication. Teachers administered the pretest to their students in the schools' computer lab or via individual student laptop computers or tablets. After completing the 20 lessons, participating teachers readministered the 10-item test used for pretesting via Qualtrics. Class completion rates were tracked in Qualtrics during the pre- and posttests, and teachers were reminded which classes had not completed the testing.

In-class student physical activity intensity levels. After pretesting was completed at each school, each participating teacher assisted me in selecting six students per sixth grade class ($n = 36$ students). Students were selected purposefully to generate a balanced sample based on gender and body mass index to wear physical activity accelerometers.

During Lessons 6–20 of the sixth grade Cardio Fitness Club unit, I collected physical activity intensity level data each time I observed a lesson. The six students selected per class were introduced to and assigned a uniquely numbered accelerometer. Each student wore the assigned accelerometer at least once during Lessons 1–5 to learn

how to put it on and to minimize the reactivity effect of wearing the accelerometer for the first time. Students put on the accelerometer as they entered the gymnasium from the locker room and returned it just prior to reentering the locker room at the end of the class period. I observed each student attach the accelerometer to his or her waist to ensure the proper positioning of the accelerometer. Students were asked to wear the device on their waist above their right knee using a supplied elastic waist band. During physical activity intensity level data collection, I recorded lesson unit and number and lesson start and end time.

Data Reduction

Lesson observations. I transcribed the lesson observation field notes into individual Microsoft Word files organized by school and teacher observation dates. The transcription process allowed me to become more acquainted with the data.

Standardized knowledge growth. Student standardized knowledge test item responses were downloaded from Qualtrics to the Statistical Package for the Social Sciences (SPSS; IBM SPSS Statistics Version 20, Release 20.0.0, IBM, Inc., Armonk, NY) and organized by teacher and class. On the pre- and posttests, individual item responses were converted from answer selected (i.e., 1 = A, 2 = B, 3 = C, and 4 = D) to answer correct (coded as 1) or incorrect (coded as 0). Pre- and posttest total raw scores were determined for each student by summing their individual item responses. Each student's pretest raw score was then subtracted from his or her corresponding posttest raw score to produce a change score. The students' change scores were averaged in each class to produce an average class change score (see Table 1).

In-class student physical activity intensity levels. In-class student physical activity intensity levels were recorded as vector magnitudes by the Actigraph GT3X+ accelerometers. Vector magnitudes were downloaded from ActiLife 6 (Actigraph, Pensacola, FL) to SPSS. Total vector magnitude for each measured student was converted to vector magnitude per minute to reflect in-class physical activity intensity level. Vector magnitude per minute was determined by dividing the accelerometer physical activity count sum by the total minutes (lesson end time minus lesson start time) in the respective SHL lesson. Each student's in-class physical activity intensity level per observed lesson per class was averaged to produce an average class physical activity intensity level (see Table 1).

Table 1
Class-Level Student Outcomes

School and teacher	Number of students	Knowledge change (SD)	PA intensity level (SD)
Albany Middle			
Teacher 1	23	13.9% (21.3)	2,260.03 CPM (225.75)
Teacher 2 ^a	55	12.0% (20.9)	2,069.33 CPM (85.47)
New River Middle			
Teacher 3 ^b	45	22.0% (19.4)	2,186.58 CPM (351.16)
Teacher 4	28	15.7% (19.9)	1,734.3 CPM (207.44)
St. Anthony Middle			
Teacher 5 ^b	55	17.8% (20.4)	2,520.47 CPM (426.65)
Teacher 6	23	20.9% (19.1)	2,468.28 CPM (117.57)

Note. CPM = vector magnitude count per minute.

^aOutcome data were combined from two physical education classes assigned to this teacher. ^bTeacher team-taught and absorbed the students assigned to the other teacher assisting with the lesson.

Data Analysis

Inductive analysis was used to analyze the transcribed lesson observations immediately following each school visit. “Inductive analysis involves discovering patterns, themes, and categories in one’s data. Findings emerge out of the data, through the analyst’s interactions with the data...” (Patton, 2002, p. 453). Using the constant comparative method (Glaser, 1978), I looked for codes and categories in the data. As described by Corbin and Strauss (2008), I first employed open coding of the data to determine if there were recurring topics that could be classified into categories and labeled. I elected to open code the observation field notes by hand to facilitate constant comparison and become more acquainted with the data. The generated open codes described and referred to actual events in the PE classes. Open coding allowed me to divide the data into distinct categories, look for differences and similarities within the observation field notes, and ask questions about phenomena revealed in the data (Corbin & Strauss, 2008). The open coding procedure allowed me to concentrate on the events observed in the PE classes and guided my observations as I explored cases of teacher fidelity.

Once categories were developed and labeled, I looked for relationships among the categories using axial coding. During the axial coding process, I developed subcategories focusing on phenomena, antecedents, contexts, and any intervening conditions. As suggested by Corbin and Strauss (2008), I ended my analysis with axial coding because I was only interested in using some of the tools of grounded theory and was not focused on developing theory.

Using the open and axial codes, I developed a rubric that represented the patterns reflective of the teachers' adherence, delivery quality, and coverage. A 42-item dichotomous rubric was developed from the qualitative analysis to measure teacher adherence, coverage, and delivery quality (see Figure 1). I then used the rubric to quantify teachers' FOI per observed lesson.

Once the qualitative data analysis was complete, I used the teachers' FOI scores generated by the rubric to further inform the quantitative analysis. Multiple regression was used to measure the contribution of overall lesson FOI and FOI to each of the 5Es to the prediction of class knowledge change and class physical activity intensity levels.

Results

During the coding process, four major categories emerged from the data: (a) high adherence and good delivery quality, (b) high adherence but poor delivery quality, (c) low adherence but good delivery quality, and (d) low adherence and poor delivery quality. The four categories emerged throughout and across lesson observations. No one category represented any single lesson as teachers fluctuated between the four categories as lessons progressed through their critical components. The developed rubric, therefore, contains six sections related to the critical components of the lessons. Within the six sections are statements to prompt the observer to ascertain the level of teacher delivery quality, coverage, and adherence to the lesson as designed. Table 2 displays the participating teachers' fidelity scores determined by the 42-item dichotomous rubric.

Multiple regression was used to assess the contribution of fidelity to the prediction of class knowledge change and class physical activity intensity levels over the course of the 20-lesson Cardio Fitness Club unit. The outcomes of paired sample *t* tests indicated the changes between each class's average pretest score and average posttest scores were statistically significant (see Table 3). In addition, the correlation between each class's pretest scores and posttest scores were statistically significant (see Table 3).

Science of Healthful Living (SHL) Fidelity of Implementation Observation Rubric (Target Schools)

Date of Observation _____
 Date Observation Scored _____
 School ID _____
 Teacher ID _____
 Class Period Start and End Time _____
 Grade _____
 SHL Module and Lesson _____

Raw Score = _____/42 = _____

Please check Yes (1 point) or No (0 points) for each item.

	NO	YES	COMMENTS
1. Teacher and student materials (task cards, journals, equipment) ready before class			
2. Teacher organized and familiar with lesson			
3. Teacher stated the lesson essential question			
4. Teacher referred to the lesson evaluation rubric			
5. Teacher followed the timing of the lesson (or made lesson longer)			
6. Teacher emphasized the intended science concepts throughout the lesson			
Engagement			
7. Engagement occurred as designed or occurred with appropriately substituted activities			
8. Journal used as intended			
9. Teacher models movement tasks			
10. Teacher corrects immature movement patterns			
11. Teacher checks for student understanding before moving on to the next step			
12. Teacher encourages student participation			
13. Students are engaged in the lesson segment			
14. Students are successful during activities			
Exploration			
15. Exploration occurred as designed or occurred with appropriately substituted activities			
16. Journal used as intended			
17. Teacher models movement tasks			
18. Teacher corrects immature movement patterns			
19. Teacher checks for student understanding before moving on to the next step			
20. Teacher supplies students adequate think time			
21. Teacher encourages student participation			
22. Students are engaged in the lesson segment			
23. Students are successful during activities			
Explanation			
24. Explanation occurred as designed or occurred with appropriately substituted activities			
25. Journal used as intended			
26. Teacher checks for student understanding before moving on to the next step			
27. Teacher supplies students adequate think time			
28. Teacher provides students ample opportunities to talk with their peers			
29. Teacher provides students individual turns to speak			
30. Teacher encourages student participation			
31. Students are engaged in the lesson segment			
Elaboration			
32. Elaboration occurred as designed or occurred with appropriately substituted activities			
33. Journal used as intended			
34. Teacher checks for student understanding before moving on to the next step			
35. Teacher supplies students adequate think time			
36. Teacher provides students ample opportunities to talk with their peers			
37. Teacher provides students individual turns to speak			
38. Teacher encourages student participation			
39. Students are engaged in the lesson segment			
Evaluation			
40. Evaluation occurred as designed or occurred with appropriately substituted activities			
41. Journal used as intended			
42. Physical activity homework assigned			

Figure 1. Fidelity of implementation observation rubric.

Table 2
Teachers' Average Fidelity of Implementation Scores

School and teacher	Number of observations	Total fidelity score	Engagement	Exploration	Explanation	Elaboration	Evaluation
Albany Middle							
Teacher 1	6	.48	.84	.81	.55	.06	.17
Teacher 2	6	.42	.77	1.0	.38	.1	0
New River Middle							
Teacher 3	7	.83	1.0	.82	.95	.77	.47
Teacher 4	7	.75	.83	1.0	.71	.84	.71
St. Anthony Middle							
Teacher 5	7	.8	.83	.8	1.0	.8	.66
Teacher 6	7	.82	1.0	.87	.91	.95	.74

Table 3
Differences and Correlations Between Pre- and Posttest Scores

School and teacher	Pretest (%)	Posttest (%)	Differences			Correlations	
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>t</i>	<i>df</i>	<i>p</i> *	<i>r</i>	<i>p</i> **
Albany Middle							
Teacher 1	31.7 (15.3)	45.7 (21.1)	3.14	22	.005	.35	.04
Teacher 2	33.1 (15.7)	45.1 (20.5)	4.27	54	< .001	.36	.01
New River Middle							
Teacher 3	27.8 (14.3)	49.8 (20.3)	7.62	44	< .001	.41	.01
Teacher 4	35.4 (16.2)	51.1 (18.5)	4.18	27	< .001	.35	.04
St. Anthony Middle							
Teacher 5	32.9 (14.9)	50.7 (17.8)	6.47	54	< .001	.23	.03
Teacher 6	30.9 (10.0)	51.7 (19.0)	5.25	22	< .001	.26	.04
All Teachers	31.9 (14.8)	48.8 (19.5)	12.58	228	< .001	.32	< .001

p* < .01. *p* < .05.

Regression diagnostic statistics were calculated with the multiple regression analyses to check data for cases that exerted undue influence over the parameters of the model and/or were extreme outliers (Field, 2009). Deviant cases, either individually or in combination with other cases, can significantly influence regression statistics. The following regression diagnostics were examined to check for influential data points: (a) Cook's distance (a measure of the overall influence of a case on the model), (b) leverage or hat values (gauges the influence of the observed value of the outcome variable over the predicted values), and (c) standardized DFBETA (detects cases that influence the regression coefficient). Additionally, collinearity diagnostics (i.e., tolerance and variance inflation factor) were conducted to ensure that no variables were closely related to one another. The obtained variance inflation factor in all cases but one was less than 11.5. Elaboration fidelity score had a strong collinearity with the other predictors and was excluded from all multiple regression models.

Class-level knowledge change and class-level physical activity intensity level were the criterion variables in the multiple regression analyses. Overall fidelity score was the sole predictor variable in the first analysis for each criterion variable, and the scores for the four *Es* (i.e., Engagement, Exploration, Explanation, and Evaluation) were entered in the second analysis for each criterion variable.

Overall fidelity score accounted for 79%, $\text{adj } R^2 = .74$, $F(1, 4) = 15.4$, $p < .05$, of the variance in knowledge change. The overall fidelity beta coefficient was statistically significant (see Table 4). When the four *Es* were entered as predictors, Engagement, Exploration, Explanation, and Evaluation contributed to the overall model fit for knowledge change, $R^2 = .99$, $\text{adj } R^2 = .99$, $F(4, 1) = 416.99$, $p < .05$. The beta coefficients for Engagement and Explanation were statistically significant (see Table 4).

Table 4
Regression Output for Knowledge Change

Fidelity component	<i>M</i>	<i>SD</i>	<i>B</i>	Knowledge Change			
				<i>SE B</i>	β	<i>t</i>	<i>p</i>
Overall	.68	.19	0.19	0.05	.89	3.92	.02
Engagement	.88	.1	0.23	0.01	.58	17.35	.04
Exploration	.88	.09	0.08	0.02	.2	4.5	.14
Explanation	.75	.25	0.13	0.01	.82	10.04	.04

Table 4 (cont.)

Fidelity component	<i>M</i>	<i>SD</i>	<i>B</i>	Knowledge Change			
				<i>SE B</i>	β	<i>t</i>	<i>p</i>
Evaluation	.46	.31	-0.03	0.01	-.24	-3.87	.16
Elaboration	.59	.4		Excluded from model			

Therefore, PE students taught by PE teachers with higher fidelity levels displayed more knowledge growth. The specific *Es* that significantly contributed to knowledge gain included Engagement and Explanation.

Multiple regression targeting class-level physical activity intensity levels did not produce significant findings using overall fidelity score or the scores of the four *Es* (see Table 5). The mean proportion of time spent in moderate to vigorous physical activities and sedentary activities over 40 Cardio Fitness Club lesson observations was 47.9% (*SD* = 2.4%) and 41.1% (*SD* = 2.7%), respectively (see Table 6). Twenty-one of the 40 (52.5%) lesson observations met the Centers for Disease Control and Prevention's recommendation (U.S. Department of Health and Human Services, 2010) of spending at least 50% of PE class time participating in moderate to vigorous physical activities.

Table 5

Regression Output for Physical Activity Intensity Levels

Fidelity component	<i>M</i>	<i>SD</i>	<i>B</i>	Physical activity intensity levels			
				<i>SE B</i>	β	<i>t</i>	<i>p</i>
Overall	.68	.19	514.92	437.69	.51	1.18	.31
Engagement	.88	.1	-434.57	1,463.11	-.23	-0.3	.82
Exploration	.88	.09	-1,537.38	1,966.03	-.77	-0.78	.58
Explanation	.75	.25	-131.28	1,388.38	-.17	-0.1	.94
Evaluation	.46	.31	414.15	863.57	.68	0.48	.72
Elaboration	.59	.4		Excluded from model			

Table 6*Mean Percentage of Lesson Time Spent at Different Physical Activity Intensities*

School and teacher	Sedentary^a (SD)	Light^a (SD)	Moderate^a (SD)	Vigorous^a (SD)	Very vigorous^a (SD)
Albany Middle					
Teacher 1 ^b	37.9 (9.4)	14.2 (3.4)	41.5 (7.2)	4.2 (1.9)	2.1 (2.1)
Teacher 2 ^b	42.4 (3.6)	12.5 (0.4)	38.6 (3.6)	5.5 (0.6)	1.0 (0.7)
New River Middle					
Teacher 3 ^c	37.9 (7.4)	10.8 (2.2)	41.5 (7.1)	7.8 (3.4)	1.9 (1.0)
Teacher 4 ^c	44.5 (16.8)	9.4 (2.7)	39.5 (11.6)	5.4 (4.1)	1.2 (0.7)
St. Anthony Middle					
Teacher 5 ^c	41.0 (4.0)	8.9 (3.0)	36.8 (4.8)	9.8 (4.9)	3.5 (2.1)
Teacher 6 ^c	42.7 (0.1)	10.2 (1.6)	35.1 (1.6)	9.0 (1.8)	3.0 (0.7)
All Teachers	41.1 (2.7)	11.0 (2.0)	38.8 (2.6)	7.0 (2.3)	2.1 (1.0)

^aCut-off points suggested by Freedson, Pober, and Janz (2005). ^bPhysical activity intensity level data collected on six lessons. ^cPhysical activity intensity level data collected on seven lessons.

Discussion

Few researchers have examined the impact FOI has on student outcomes (O'Donnell, 2008). They have suggested that high-fidelity implementation enhances intervention outcomes. The purpose of this study was to assess PE teachers' FOI as they implemented a research-based PE curricular intervention and to examine the relationship between teachers' fidelity to the curricular intervention and student outcomes. Several findings deserve discussion.

First, students receiving the SHL curricular intervention made statistically significant improvements in their fitness-based knowledge. The mean gain for the six PE classes was 16.9% ($SD = 20.3\%$). However, after inspecting the mean pretest score ($M = 31.9\%$, $SD = 14.8\%$) and the mean posttest score ($M = 48.8\%$, $SD = 19.5\%$), students performed below what most educators would consider proficient at the end of the intervention. The majority of the teachers and students in this study were participating in multiactivity PE pro-

grams before agreeing to participate in this study. The mean pretest score suggests that students had limited prior knowledge of fitness-based concepts. A large body of findings shows that learning proceeds primarily from relevant prior knowledge, and only secondarily from the taught information (Dochy, Segers, & Buehl, 1999). The limited relevant prior knowledge of the sixth grade students in the present investigation could have constrained their knowledge gain. It is unclear how much fitness education the students in this study received prior to enrolling in sixth grade, but it is clear that the North Carolina Essential Standards for Healthful Living for Grades 3–5 includes fitness education as a part of its standard course of study (Public Schools of North Carolina, 2011). Additionally, if the students in this study received fitness education in fifth grade, the dose and coverage would be questionable given the current trends in instructional time in elementary school PE.

Second, multiple regression shows that overall FOI accounted for 79% of the variance in fitness-based knowledge growth in sixth grade students participating in the curricular intervention. Overall, FOI made a statistically significant contribution to the prediction of student knowledge gain. Specific *Es* (i.e., Engagement and Explanation) had a statistically significant effect on knowledge gain. These findings reinforce earlier research demonstrating that FOI has statistically significant implications on student outcomes (Allinder, Bolling, Oats, & Gagnon, 2000; Butler-Songer & Gotwals, 2005; Hall & Loucks, 1977; Penuel & Means, 2004; Ysseldyke, Spicuzza, Kosciolk, & Boys, 2003). Therefore, the more faithful teachers are to teaching research-based curricula as designed, the greater the impact the curricula can have on student achievement. During a time of student and teacher accountability, it is critical that educators use curricula proven to be effective.

Although no statistically significant relationships were found between teacher fidelity levels and student physical activity intensity levels, it is worth noting that approximately 48% of all observed lesson time involved moderate to vigorous physical activities. This proportion is slightly higher compared with other studies (e.g., Chow, McKenzie, & Louie, 2009; McKenzie et al., 2006) reporting physical activity intensity levels during PE lessons. I also found that in over 52% of the observed lessons, students spent at least 50% of the PE lesson time participating in moderate to vigorous physical activities. Data like these are limited in other studies, but it is clear that approximately 48% of the observed lessons did not meet the

Centers for Disease Control and Prevention's recommendation for moderate to vigorous physical activity.

As with most research studies, this investigation had a few limitations deserving discussion. First, I relied on six fidelity checks at one school and seven fidelity checks at the other two schools. A more thorough account of teacher FOI and its impact of student outcomes would have been attained with more frequent fidelity checks (e.g., daily). Second, although a representative matched sample with control group was used in the NIH randomized control trial, only a subset of this population was examined in this research. Specifically, the first-year (in the intervention) middle school teachers participating in this study were not demographically representative of the sample of teachers participating in the larger NIH-sponsored study. Therefore, the findings of the study have limited generalizability. Additional research should be implemented using a larger, demographically heterogeneous sample size to satisfy the statistical assumptions associated with multiple regression.

The findings have potential to address the challenge of implementing effective approaches in practice. Cook, Landrum, Tankersley, and Kauffman (2003) highlighted that approaches may be rendered counterproductive or ineffective when implemented with inadequate fidelity or if not used with appropriate dosage (amount of treatment). Considering this problem in the context of the current investigation, teachers implementing the *SHL* curriculum (a research-based PE intervention) with lower FOI experienced smaller increases in knowledge gain compared with teachers implementing the intervention with higher FOI. Failing to consider FOI is a major threat to internal validity. The role of the intervention in enhancing or constraining outcomes cannot be fully determined without measuring FOI.

Using procedures integrated into the research design for maximizing internal validity enhances the integrity of study findings. The findings of this study highlighted that the extent to which the intervention was taught as prescribed (quality), the extent to which the content was delivered (coverage), and the extent to which the internal structure of the lessons were maintained during delivery (structure) can significantly affect student outcomes. Given that few researchers to date have assessed the role of FOI on PE outcomes, future fidelity research in PE is justified. Monitoring FOI may modify outcomes of existing and future program effectiveness, efficacy, and evaluation studies of PE curricula.

Additionally, practicing teachers need continual professional development and support to implement and maintain evidence-based practices in their classrooms. To build and maintain teachers' capacities to deliver effective programs, they need frequent and consistent support for a minimum of 1 year in the form of instruction, feedback, and motivators (National Institute of Child Health and Human Development, 2000). Furthermore, researchers (e.g., Gersten & Brengelman, 1996) have suggested that successful teacher training for evidenced-based practices follows when content and approaches are similar to the values, beliefs, and goals of important school staff (i.e., lead teachers and administrators). It is also important that coaches and principals use valid and reliable fidelity measures to facilitate continuing mentoring and classroom observations. Structuring observations to identify crucial teaching behaviors offers a method to examine teacher ability/effectiveness to implement evidence-based practices. In this research study, adherence to lesson delivery as intended (i.e., following the lesson structure and script) appeared to increase the contribution of the PE curriculum to student knowledge gain. Teachers and administrators may consider incorporating fidelity into existing documents used for mentoring or administrative observations.

In summary, statistically significant growth was evident in the fitness-based knowledge of sixth grade PE students, but results varied as PE teachers taught the *SHL* curriculum with different fidelity levels. High fidelity requires time and effort. In spite of years of teaching experience, it requires numerous professional development opportunities to educate teachers and staff about how to implement evidenced-based educational interventions. Increasing fitness-based knowledge at the middle school level is possible when scientifically based PE instruction is conveyed with fidelity.

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TEACHER EDUCATION

Work Ability of Finnish Physical Education Teachers

Kasper Mäkelä and Mirja Hirvensalo

Abstract

In the physical education (PE) teachers' profession, physical tasks comprise a large part of the job. PE teachers identify their health as good, and they are satisfied with their job. Nevertheless, the work ability of PE teachers may be decreasing. Purpose: The purpose of this article was to explore the work ability of Finnish PE teachers. What disorders or physical problems do PE teachers experience as a result of their job, and how do they affect job satisfaction? Are there differences between men and women or older and younger teachers? Of the Finnish PE teachers (N = 655), 31% reported that they had at least one disease or disorder that hindered their work ability. The most common were musculoskeletal disorders. PE teachers identified knee and back problems in particular. Good ability to work was related to higher job satisfaction.

Work ability can be defined in many ways. According to Ilmarinen (1999), work ability includes individual and occupational factors that are essential to a person's ability to cope in his or her work life. Work ability is the result of the interaction between an individual's resources (health, functional capacity, education, and know-how) and work. In addition, a person's values and attitudes, motivation, and job satisfaction influence individual resources. Overall, work contribution is based on personal resources, which are influenced by the work community and the work environment. In the teaching

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profession, the work environment includes facilities and available resources for teaching. The mental and physical demands of work also influence the overall result (Ilmarinen, 1999).

Work ability and its factors can be described in many ways. Individual resources, work-related factors, and work environment can be depicted in the form of the work ability house, its floors, and surrounding environment (Ilmarinen, 2006). The first three floors are the core structure of work ability. The first floor consists of health and functional capacity, including mental and physical health and physical fitness. The second floor contains professional competence and the third floor motivation, values, and attitudes. The fourth floor comprises the work environment, work community, and supervision of the work. In the surroundings of the house, there are family and close community such as relatives and friends as well as organizations that support work (occupational health care and safety). Society is the outermost layer, which creates the macro-environment of work ability (Ilmarinen, 2006).

Maintaining the ability to work is essential for an individual. According to Hasselhorn, Tackenberg, and Müller (2003), a high capability to work is accompanied by a longer active work life and is associated with lower cost to the national social system (Seibt, Spitzer, Blank, & Scheuch, 2009). According to Tuomi, Huuhtanen, Nykyri, and Ilmarinen (2001), decreased work ability increases the risk of premature retirement.

Work ability is related to age. Various factors (work environment, work content, work community, and the resources of individual workers) influence work ability (Ilmarinen, 2001). The imbalance of functional capacities and work demands is a general problem for aging workers (Bugajska & Łastowiecka, 2005). Work ability can be supported by service and support systems, work and retirement legislation, and changes in values and attitudes (Ilmarinen, 2001).

Work and Work Ability of PE Teachers

The everyday life of physical education (PE) teachers is varied and busy. Lessons can be held in different locations, which is why PE teachers must move many times throughout the school day. The profession includes different tasks, but the main content of PE teachers' occupation is teaching PE or health education (Mäkelä, Hirvensalo, Palomäki, Herva, & Laakso, 2012). In the profession of the PE teacher, duties that strain teachers physically include demonstrating technical moves; teaching sports (e.g., aerobics);

refereeing; exposure to outdoor conditions (cold, rain, wind, heat); frequent travel between workplaces; and carrying, displacing, and storing heavy objects or equipment (Bizet, Laurencelle, Lemoyne, Richard, & Trudeau, 2010; Sandmark, Wiktorin, Hogstedt, Klenell-Hatschek, & Vingård, 1999). PE teachers' work environment often includes excessive noise (Jiang, 1997). There might also be mentally stressful moments in the PE teacher profession. For example, disagreement with pupils, parents, peers, or the administration; busy schedules; hurry; and high workload can cause a feeling of insufficiency or burnout (Mäkelä, Hirvensalo, Palomäki, Herva, & Laakso, 2012). Alongside the physically and mentally stressful elements of teaching PE are other risk factors such as student violence, broken equipment, and safety spotting of students that are perceived as occupational risks by PE teachers (Lemoyne, Laurencelle, Lirrette, & Trudeau, 2007). Occupational risks have been reported to increase along with age (Kovač, Leskošek, Hadžić, & Jurak, 2013a) at 7.6% per year. Likewise, increasing age generally increases the odds ratios for occupational health problems, however, at a much lower rate than that for injuries. These were statistically significant especially for musculoskeletal problems (e.g., lower back pain, hip, knee) as well as auditory problems (Kovač, Leskošek, Hadžić, & Jurak, 2013b). Studies have also shown that primary school teachers are almost twice as likely as secondary school teachers to identify lower back pain and dysphonia (Kovač et al., 2013b).

Sandmark (2000) studied PE teachers' work ability in Sweden. The PE teachers reported fewer serious diseases and better general health than the control group. Likewise, Trudeau, Laurencelle, and Lajoie (2014) concluded that PE teachers have better physical fitness than the average population. However, PE teachers identified more osteoarthritis of the knee and hip than the control group. Likewise, PE teachers reported higher prevalence of low back pain, and female teachers reported more elbow disorders than the control group (Sandmark, 2000). Lower back pain has also been found to be more common among Japanese PE teachers than among other general education teachers (Tsuboi, Takeuchi, Watanabe, Hori, & Kobayashi, 2002). Slovenian PE teachers identified lower back pain as the most common health problem, along with voice disorders and auditory problems (Kovač et al., 2013b). In addition, shoulder disorders were reported to be common for PE teachers in a Swedish study (Åstrand, Bergh, & Kilbom, 1997). According to Rakovac and Heimer (2008), Croatian PE teachers reported musculoskeletal dis-

turbances were common, as well as respiratory, cardiovascular, and gastrointestinal problems. Of the PE teachers, 62.8% reported having some disorders (Rakovac & Heimer, 2008). Many movements are associated with occupational problems. The most common is the standing position, but flexing the knee, rotating the trunk, picking up objects, jumping, and carrying heavy objects are sources of problems (Lemoyne et al., 2007).

The work ability of the Finnish working population has been studied for a long time (Seitsamo et al., 2011). However, there has been little discussion about the work ability of teachers. What is known about the work ability of Finnish teachers is largely based on studies by Kinnunen, Parkatti, and Rasku (1994); Kinnunen and Salo (1994); and Louhevaara, Ilmarinen, Pitkänen, and Antikainen (1990). According to Kinnunen et al. (1994), PE teachers estimated their health was much better than that of their age peers. Instead, PE teachers yielded the poorest work ability group with vocational subject teachers. The work ability of older women was poor in particular. Louhevaara et al. (1990) studied the work ability of Finnish PE teachers older than 45 years of age. They found that 41% of the respondents felt that the physical workload was too hard and 45% stated that the demands in the work environment were too tough. Nearly two thirds of the respondents stated that they suffered from musculoskeletal disorders. Nearly one fourth of the respondents identified that the mental load hindered their work ability (Louhevaara et al., 1990). A significant effect of age and teaching experience on the rate of chronic disorders has also been found elsewhere (Lemoyne et al., 2007).

Over the years, the time allocation for PE in Finland has changed several times and currently is 2 hr per week in comprehensive school Grades 1 to 9 (Heikinaro-Johansson & Telama, 2005). However, in the near future, PE will be increased in the new National Core Curriculum for Basic Education (Finnish National Board of Education, 2014). In Finland, the mean PE teaching hours is 25 hr per week and duties other than teaching total 9 hr per week. Organization of PE is generally good, but some schools lack facilities and equipment. In addition, sometimes classes may be too large (more than 25 pupils). Despite the slightly lower status, PE teachers are satisfied with their jobs (Mäkelä et al., 2012).

The purpose of this article was to describe the work ability of Finnish PE teachers and to find out the differences in work ability between genders and age groups. In addition, we determined the

main diseases and disabilities that teachers experience. We hypothesized that teachers' work ability is associated with age and gender. Especially older women have more disorders or diseases than do men in older age groups. We further hypothesized that the main problems with work ability among PE teachers are with the knees, hips, shoulders, and back.

Method

Participants

The Association of Finnish Physical and Health Educators carried out a study in cooperation with the University of Jyväskylä for PE teachers in Finland. A structured questionnaire was sent to the members of the association ($N = 1,541$). A total of 667 members (male = 187, female = 480) answered the questionnaire. Of these respondents, 12 were retired. Thus, the final sample was 655 PE teachers (male = 186, female = 469). Having read the information document that accompanied the questionnaire, the teachers confirmed their informed consent to participate in this research by completing the questionnaire.

Questionnaire

The questionnaire was formed using different questionnaires to form a consistent questionnaire with equal scales for the different aspects of work ability. For physical health, mental health, and work ability, we used questions from the Quality of Life (Spitzer et al., 1981); for physical fitness, we used questions from the study by Sollerhed, Apitzsch, Råstam, and Ejlertsson (2008). The work motivation question was based on Dittrich, Büsch, and Micheel's (2011) study; the scale for salary, working conditions, and relations with colleagues was developed by Knoop (1994); the administration of the work and professional competence scale was based on Bogler's (2001) study; the work environment scale was developed by Feldt (1997); the balance between work and family was based on Valcour's (2007) study; and the stress resilience scale was developed by Delahajj, van Dam, Gaillard, and Soeters (2011). For the present study, the data were categorized as follows:

- **Demographic variables:** gender, age group (1 = 30 years or younger, 2 = 31–50 years, and 3 = 51 years or older), job contract (1 = permanent, 2 = terminable, 3 = part time)

- **Job description:** teaching hours, work hours other than teaching, size of school (1 = 0–250, 2 = 251–400, 3 = 401–550, 4 = 551–1000)
- **Physical and mental health:** (i) my fitness is, (ii) my physical health is, (iii) my mental health is, (iv) my stress tolerance is (1 = *very bad*, 2 = *bad*, 3 = *neither bad nor good*, 4 = *good*, 5 = *very good*)
- **Work ability:** (i) my professional competence is, (ii) my work ability is, (iii) my work motivation is (1 = *very bad*, 2 = *bad*, 3 = *neither bad nor good*, 4 = *good*, 5 = *very good*), (iv) do you have a disease or disability that interferes with your work ability (1 = yes, 2 = no), (v) open-ended questions of diseases or disabilities were categorized in the same groups classified in the Work Ability Index (Tuomi & Oja, 1998; musculoskeletal disorders, respiratory system diseases, cardiovascular diseases, several diseases, other diseases), (vi) what are the main threats to your work ability (open-ended questions were categorized as follows: physical fitness, workload, age, keeping up to date, mental stress, working conditions, and voice control)
- **Satisfaction and rewards:** (i) how satisfied are you with your job, (ii) how satisfied are you with your salary, (iii) how satisfied are you with your ability to balance the needs of your job with those of your personal or family life (1 = *very dissatisfied* to 5 = *very satisfied*)
- **Work environment:** (i) the atmosphere of the work environment is, (ii) my work conditions are, (iii) the administration of my workplace is (1 = *very bad*, 2 = *bad*, 3 = *neither bad nor good*, 4 = *good*, 5 = *very good*)

Data Analysis

The data analysis began with descriptive statistics that represent the means and standard deviations for PE teachers' background variables. The differences in the work ability variables between men and women and age groups were analyzed with independent sample *t* tests and analysis of variance (ANOVA). Cohen's *d* statistic was used to report the effect size of differences. It was considered large when .80 or higher, moderate at about .50, and small when it was .20 or less.

Results

Of the 655 PE teachers in this study, 84% had a permanent job, 14% were working with a fixed contract, and 2% had a part-time job. The mean age was 44 years ($SD = 10$ years), and the mean teaching hours was 23.3 hr ($SD = 6.7$ hr) and 8.6 hr ($SD = 9.5$ hr) for duties other than teaching. Most of the teachers (54%) taught in midsize schools (251–550 pupils). PE teachers identified their physical fitness ($M = 4.05$, $SD = 0.73$), physical health ($M = 3.99$, $SD = 0.76$), mental health ($M = 4.13$, $SD = 0.70$), and stress tolerance (3.95, 0.73) as good. Likewise, work motivation ($M = 3.86$, $SD = 0.85$), professional competence ($M = 4.10$, $SD = 0.54$), and work ability ($M = 4.13$, $SD = 0.64$) were good among PE teachers. Men identified their fitness ($p = .013$) and work ability ($p = .011$) better than did women. Those in the youngest age group (30 years or younger) identified their physical fitness better than did those in the oldest age group (over 50 years old). Those in the oldest age group identified their work ability lower than did those in the middle age ($p = .044$) and youngest age groups ($p = .026$). In contrast, those in the youngest age group identified their professional competence lower than did those in the middle age ($p = .028$) and oldest age groups ($p = .018$). There was no difference in mean age between men (42.4) and women (43.8).

Of the PE teachers, 31% reported that they had at least one disease or disorder that hindered their work ability. There were no statistical differences in prevalence of diseases or disorders between men and women, $\chi^2(1) = 0.641$, $p = .42$. The most common work ability problems among PE teachers were musculoskeletal disorders (71% of respondents identified work ability problems). In addition, respiratory system diseases were common among PE teachers (11%). Six percent identified that they were suffering from several diseases or disorders. Among those who identified musculoskeletal disorders, knee (31%) and back (27%) problems were the most common. PE teachers considered issues related to physical fitness the main threat to their ability to work in the future (35% of the respondents). Other common concerns were related to workload issues (22%), mental stress issues (21%), “keeping up to date” (8%), age concerns (7%), working conditions (6%; e.g., problems with indoor air or working in cold or wet conditions), and voice control (1%). Among the youngest age group, the most common concern was issues related to mental stress (33% of the group), whereas issues related to work ability were most common in other groups (38% and 34% among

older age groups; Table 1). Women (25%) identified workload issues more than men did (13%, $p = .008$), whereas men (33%) were more concerned about mental stress issues than were women (17%, $p = .002$).

Table 1

Most Commonly Identified Issues Related to Future Challenges for Work Ability Among Age Groups and Genders (%)

Age	PF	WL	Age	Update	MS	WOC	VC
Total	35	22	7	8	21	6	1
< 30 years	19	25	3	6	33	11	3
31–50	38	24	5	7	18	7	1
> 51	34	16	13	9	24	4	0
Men	31	13	5	8	33	9	1
< 30 years	23	15	0	0	54	8	0
31–50	36	13	5	9	27	9	1
> 51	20	15	5	10	40	10	0
Women	37	25	7	7	17	6	1
< 30 years	18	30	4	9	22	13	4
31–50	39	28	4	7	15	6	1
> 51	37	17	15	9	19	3	0

Note. PF = physical fitness; WL = workload; MS = mental stress; WOC = work conditions; VC = voice control.

The PE teachers were satisfied with their work ($M = 3.8$, $SD = 0.81$). The teachers were also satisfied with their personal and work–life balance ($M = 3.7$, $SD = 0.92$), work conditions ($M = 3.6$, $SD = 0.92$), and atmosphere in the workplace ($M = 3.6$, $SD = 0.90$). However, PE teachers were not as satisfied with the salary ($M = 3.2$, $SD = 0.85$) and administration of the work ($M = 3.4$, $SD = 1.06$; Table 2). There were no differences between age groups of gender. The PE teachers who identified their work ability as good or very good were more satisfied with their job ($p < .001$). They were also more motivated to do their work and considered their professional competence better than did those who did not identify their work ability as good or very good.

Table 2

Comparison of PE Teachers' Background Variables and Work Ability Items Between Men and Women (t Test)

Variables and work ability items	Men		Women		<i>p</i>	Range for all
	<i>M</i> (SD)	<i>n</i>	<i>M</i> (SD)	<i>n</i>		
Age	42.5 (9.9)	185	43.9 (10.2)	469	0.104	22–63
Teaching hours	23.6	138	23.3	327	0.712	2–36
Other than teaching hours	8.6	104	8.7	250	0.977	1–50
Job satisfaction	3.9	142	3.8	329	0.081	1–5
Physical fitness	4.2	140	4.0	317	0.015	1–5
Physical health	4.0	140	4.0	317	0.677	2–5
Mental health	4.2	140	4.1	317	0.167	1–5
Stress tolerance	4.0	140	3.9	317	0.080	1–5
Work ability	4.3	140	4.1	317	0.012	1–5
Work motivation	3.8	140	3.9	317	0.741	1–5
Atmosphere	3.6	140	3.6	317	0.703	1–5
Work conditions	3.7	140	3.6	317	0.324	1–5
Expertise	4.1	140	4.1	317	0.501	2–5
Administration	3.5	140	3.4	317	0.435	1–5
Salary	3.2	140	3.2	317	0.558	1–5
Free time with family	3.7	140	3.7	317	0.908	1–5

Discussion

The purpose of this study was to determine the work ability of Finnish PE teachers. This study provides new and updated information about PE teachers' work ability, main disorders, and main threats to the teachers' ability to work in the future. This study included 655 PE teachers, of whom 28% were male. This is close to the overall distribution of men and women as overall 31% of the association's members are men.

Generally, PE teachers identified their physical fitness work ability as good. The oldest teachers identified their work ability lower than did the youngest and middle-aged teachers. Likewise,

female PE teachers identified their work ability lower than did their male counterparts. These results are in line with previous results by Kinnunen et al. (1994). The PE teachers estimated their physical fitness was high compared with that of their age peers, but especially older female teachers' work ability was poor. As in previous studies (e.g., Louhevaara et al., 1990), the PE teachers in this study found that work ability was their biggest concern related to the future.

Results of this study can be viewed with the work ability house (Ilmarinen, 2006). In the first floor of the house, there is health and functional capacity. In the PE teaching profession, this is more important than in many other professions. If the health and functional capacity is wobbly, the whole work ability house may collapse. Functional capacity seems to be the most common disorder in this study. The PE teachers in this study identified musculoskeletal disorders as the main obstacles to work ability. In Sandmark's (2000) and Louhevaara et al.'s (1990) studies, musculoskeletal disorders were also common in PE teachers. In addition to respiratory system diseases, several diseases were reported to hinder work ability. PE teachers considered issues related to physical fitness the main threat to their work ability. Workload issues were also highlighted in this study. These disorders and workload issues are not surprising as the job description includes physically stressful movements and situations. PE teachers' workload could be reduced with administration tasks. Likewise, the physical education teacher education (PETE) programs in Finland include health education as a minor subject for almost all PE graduates, so offering more health education for older PE teachers would decrease their physical workload. Better teaching arrangements such as schedules, smaller teaching groups, and enough time for recovery could also reduce teachers' workload. However, because these health issues are now well known, they should be considered more in the PETE program and in the professional development of PE teachers. Preventive exercise programs to strengthen back muscles and support knee joint muscles are needed. In Finland, the first rehabilitation courses especially for PE teachers were implemented in 2014. The feedback from these courses has been positive and promising. However, additional preventive strategies should be arranged in the future so the work ability of PE teachers can be guaranteed in their later work years, so the basis of the house of the PE teachers' work ability, health and functional capacity, is in order.

As Lemoyne et al. (2007) concluded, additional preventive strategies for reducing occupational risks among PE teachers should be explored. Researchers must address concerns not only about musculoskeletal disorders and hip, knee, and shoulder problems but also about hearing. PE classes will be noisy in the future, but according to Jiang (1997), the whistle generates the highest noise level. For example, use of electronic whistles could decrease noise levels. Work ability was related to job satisfaction. Thus, maintaining work ability could not only maintain job satisfaction but also retain PE teachers in the profession.

Although these results are based on a study conducted in Finland, PE teachers all over the world face the same issues. Sport cultures vary across countries, but the basic duties in different sports from the perspective of PE teachers are similar. PE teachers must pick up, carry, displace, or store heavy objects or equipment; demonstrate technical moves; travel frequently between workplaces; and provide instruction for different sports.

Recently, the Finnish government decided to raise the retirement age. The retirement age has been raised to 65 and 68 in the future. In other countries, there is also pressure to raise the retirement age. It is reasonable to consider whether it is possible or even reasonable to work as a PE teacher at the age of 67. It has been shown that PE teachers suffer from different disorders. In the profession, teachers must move and help students with different tasks. PE teachers are exposed to injuries, especially in the 60 and older age group. Whether older PE teachers' workload could be reduced with health education or teaching other subjects should be considered. Administration duties could also lessen the workload of PE teachers.

In the future, more research should be directed to explore the reasons behind PE teachers' disorders. Are these disorders related to injuries incurred during PE teaching? Could these disorders be prevented?

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