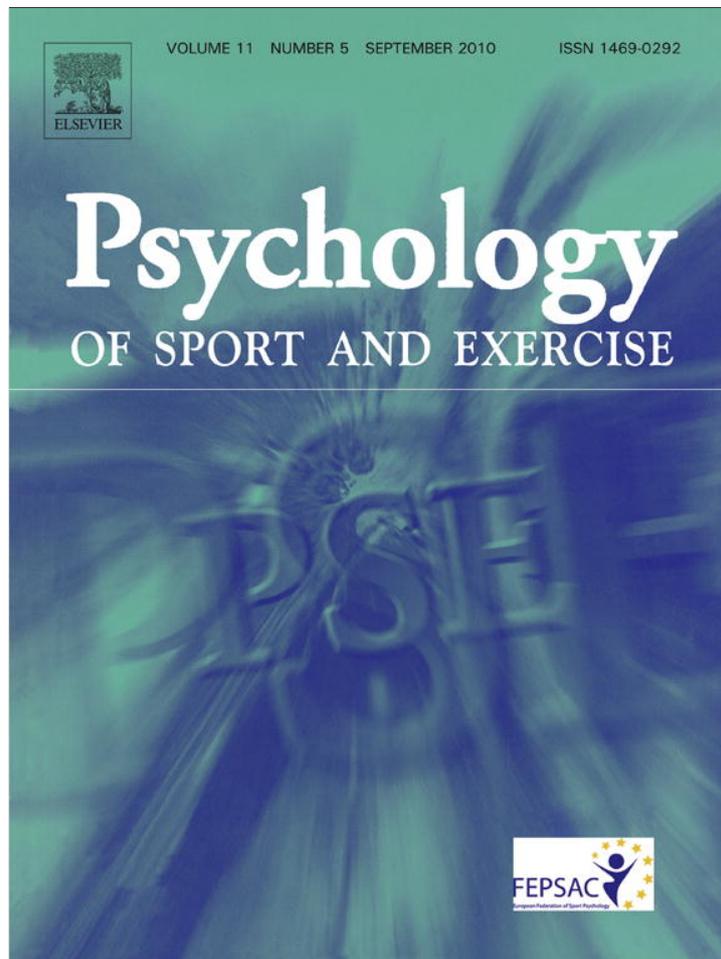


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## The motivational relevance of peer and teacher relationship profiles in physical education

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### ABSTRACT

**Objectives:** The purpose of this study was to identify combinations or profiles of peer (i.e., friendship quality, peer acceptance) and teacher (i.e., perceived support) relationship variables in physical education and then test for motivation-related differences among the emergent profiles.

**Design:** Cross-sectional survey.

**Method:** An online survey assessing study variables was completed by 7th and 8th grade physical education students ( $n = 244$ ).

**Results:** Three meaningful profiles emerged: a *Mixed* profile ( $n = 67$ ) with relatively high peer acceptance, a trend toward relatively high friendship quality and relatively low teacher support, a *Weak* profile ( $n = 74$ ) with relatively low peer relationships and teacher support, and a *Positive* profile ( $n = 103$ ) with relatively high teacher support and a trend toward high peer relationships. Two MANOVAs showed significant main effects ( $p < .01$ ,  $\eta_p^2 = .30$  and  $.17$ ) with follow-ups specifying that the *Positive* profile had higher ( $p < .01$ ) perceived autonomy, relatedness, self-determined motivation, enjoyment, effort and value compared to the others, both the *Positive* and *Mixed* profiles experienced less ( $p < .05$ ) worry, higher perceptions of competence and physical activity than the *Weak* profile, and the *Mixed* and *Weak* profiles experienced similar perceptions of autonomy, self-determined motivation, effort, and value.

**Conclusions:** Profile differences suggest that positive relationships with both teachers and peers are associated with optimal physical education experiences. Positive peer relationships, even when teacher support is relatively low may afford some advantages within this setting.

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Physical education has been identified as a critical avenue for promoting a physically active lifestyle (Ward, Saunders, & Pate, 2007) and research has supported the link between more positive physical education experiences and higher levels of leisure-time physical activity in young adolescents (Cox, Smith, & Williams, 2008; Hagger et al., 2009). However, when students reach early adolescence and many make the transition into a secondary school setting, their cognitive, emotional and behavioral experiences in physical education are quite diverse. These students exhibit a wide range of: positive (e.g., enjoyment) and negative (e.g., anxiety) affect, values they place on physical education, concentration levels, effort and preferences for challenge during class (e.g., Cox, Duncheon, & McDavid, 2009; Ntoumanis, 2001; Standage, Duda, & Ntoumanis, 2005, 2006). A substantial body of research grounded in self-determination theory has supported the roles that self-

determined motivation and satisfaction of the needs for competence, autonomy and relatedness (see Deci & Ryan, 1985; R.M. Ryan & Deci, 2007) play in explaining these individual differences in the physical education setting (Cox & Williams, 2008; Ntoumanis, 2005; Standage, Duda, & Ntoumanis, 2003; Standage et al., 2006).

Self-determination theory (Deci & Ryan, 1985; R.M. Ryan & Deci, 2007) suggests that individuals have innate psychological needs to interact effectively in their environment (i.e., feel competent), exercise free will (i.e., feel autonomous), and have meaningful social connections with others (i.e., feel related). Further, the extent to which these three needs are fulfilled is theorized to relate positively to the degree of self-determination characterizing individuals' motivation. Motivation that is self-determined emanates from sources within the self (e.g., experiencing enjoyment and satisfaction from the activity) rather than sources outside of the self (e.g., pressure from others, avoiding punishment) and is purported to lead to more positive cognitive, affective and behavioral consequences. The positive association between need satisfaction and self-determined motivation has been well-supported in physical education research (e.g., Cox & Williams, 2008; Standage et al., 2006).

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Thus, examining how various social factors relate to self-determined motivation through perceptions of competence, autonomy and relatedness has become the focus of recent investigations.

Physical education research grounded in the self-determination theory perspective has primarily focused on the role of the motivational climate (e.g., Cox & Williams, 2008; Ntoumanis, 2001) and autonomy support (e.g., Standage et al., 2006; Standage & Gillison, 2007) in fulfilling or thwarting the three psychological needs and, indirectly, self-determined motivation and associated consequences. This research has revealed that greater perceptions of a mastery climate and autonomy support from one's teacher are associated with greater feelings of competence, autonomy and relatedness and, indirectly, more self-determined motivation. More recently, specific sources of relatedness support in physical education have been explored as potential avenues for fostering self-determined motivation. Ryan and Powelson (1991) have stressed the importance of having close, supportive relationships with adults in the school setting to encourage the internalization of behavioral regulations such as the amount of effort students exert in school. Indeed, research with young physical education students has found that higher perceptions of social support (i.e., caring and interest in the student) and encouragement to work together from physical education teachers are associated with greater feelings of competence, autonomy and relatedness in class as well as more self-determined motivation (Cox & Williams, 2008; Standage et al., 2005). However, teachers are not the only viable sources of relatedness support in the physical education setting. In addition to teachers, recent research shows that the extent to which students feel accepted by their peers in physical education and the quality of their closest friendship in that class also appear to support general feelings of relatedness in class and, indirectly, self-determined motivation (Cox et al., 2009). Further, supportive relationships with both teachers and peers in physical education have been shown to relate indirectly to relevant motivational consequences such as the degree of enjoyment and worry about performing that students experience in class (Cox et al., 2009).

Initial research on sources of relatedness perceptions supports the independent roles that relationships with teachers and peers play in students' motivational experiences in physical education, but it is still unknown how different combinations of these relationship variables shape students' experiences in this context. For example, can close friendships in class help buffer against the negative impact that low teacher support may have on students' motivation? Or is a supportive relationship with one's teacher as beneficial as positive relationships with both teachers and peers? Youth sport research has begun to consider combinations of multiple social relationships in association with motivation-related outcomes (A.L. Smith, Ullrich-French, Walker, & Hurley, 2006; Ullrich-French & Smith, 2006, 2009; VanYperen, 1995). Ullrich-French and Smith (2006, 2009) examined the main effects and interactions among parent-child relationships, peer acceptance, and friendship quality predicting sport motivation and continued participation in sport. The findings indicated that having at least two relationship perceptions that are more positive yielded the most adaptive sport motivation and greater chance of continued participation. Although there is some evidence for the compensatory role of having one positive social relationship when another important relationship is less than optimal (e.g., Gauze, Bukowski, Aquan-Assee, & Sippola, 1996; Parker & Asher, 1993), it appears that in the sport context multiple sources of social support may be required for optimal motivation.

In a different approach, developmental (Seidman et al., 1999) and sport psychology (A.L. Smith et al., 2006) researchers have applied cluster analysis to examine different combinations of peer

relationship variables. Findings have revealed naturally occurring profiles of peer relationships characterized by relatively high, low, and a mixture of high and low levels of peer relationship variables (Seidman et al.; A.L. Smith et al.). Within a sport context, these profiles were distinguished by motivation-related constructs, suggesting that different combinations of peer relationships yield unique sport experiences (A.L. Smith et al.). Overall, these findings provide initial evidence for the usefulness of exploring how combinations of multiple social relationships impact youths' experiences in various physical activity settings.

Teachers and peers comprise the social context of physical education and research has supported their independent roles in motivational processes. However, there has been no consideration of how different combinations of these relationships are experienced in the physical education context. Examining combinations of relationships presents a more "real world" view of a social context and may provide practical information about the sources and number of supportive relationships that coincide with the most positive physical education experiences. Therefore, the purpose of this study was to use cluster analysis to identify naturally occurring profiles of middle school physical education students based on the relationship variables of perceived teacher support, peer acceptance and friendship quality. Further, we aimed to investigate whether students' motivational experiences in physical education were distinct across the emergent profiles. Thus, profiles were tested for differences in a variety of motivation-related variables including students' perceived competence, autonomy, relatedness, self-determined motivation, value, enjoyment, worry, effort and physical activity. It was hypothesized that students with profiles represented by higher values on the three relationship variables would report higher perceptions of competence, autonomy, relatedness, self-determined motivation, value, enjoyment, effort and physical activity and less worry.

## Method

### *Participants and procedure*

Once approval was received from the institutional review board and school administrators, 7th and 8th grade students from a junior high school in the Midwest region of the United States were invited to be participants in this study. Students were sent home with a letter describing the study and a parental consent form. Only those students who returned a signed parental consent form were then invited to complete an online survey in the school's computer lab during a regularly scheduled physical education class during the middle of the fall semester. Students were first told that the purpose of the study was to learn more about their experiences in physical education and then provided their assent to participate by proceeding with the online survey. No students declined to participate. Specific instructions were provided throughout the duration of the class period and research assistants were available to answer questions. Participants included 249 students ( $M_{\text{age}} = 12.75$ ;  $SD_{\text{age}} = 0.72$ ). Students were 54% female and mostly Caucasian (83%). The remaining students identified themselves as Black (3.7%), Asian (2.4%), American Indian (1.6%), Hispanic/Latino (5.3%) or "Other" (4.5%). Students participated in physical education classes for approximately 40 min every other day during the school year.

### *Measures*

The following measures were contextualized to physical education and have received adequate support for construct validity and exhibited good internal consistency reliability in middle school physical education settings (Cox et al., 2009; Ullrich-French

& Cox, 2009). Unless otherwise noted, the mean of the items from each measure were used to represent each construct in all analyses with higher scores indicating higher perceptions, feelings or behavior. Negatively worded items were reverse-scored prior to calculating the variable means.

#### *Perceived teacher support*

Patrick and Ryan's (2005; A.M. Ryan & Patrick, 2001) four-item measure of perceived emotional support used in academic settings assessed students' perceptions that their teacher cares about and is interested in them as individuals. Each item was modified with the addition of "PE" in front of the word "teacher" and students responded to items (e.g., "Does your PE teacher really understand how you feel about things?") on a 5-point scale ranging from *Not at all* (1) to *Very much* (5).

#### *Friendship quality*

Sixteen items from the Sport Friendship Quality Scale (Weiss & Smith, 1999) assessed the quality of each student's relationship with their closest friend in their physical education class. The self-esteem enhancement and supportiveness, loyalty and intimacy, things in common, and companionship and pleasant play subscales were used to capture positive aspects of friendship quality. Two subscales, conflict and conflict resolution, were not included in order to assess positive aspects of friendship quality and to maintain a survey of reasonable length, respectively. Students responded to items with reference to their closest friend in their current physical education class. Items (e.g., "My friend and I can talk about anything") were scored on a 5-point scale ranging from *Not at all true* (1) to *Really true* (5). A global index of positive friendship quality was created using the mean of all 16 items.

#### *Perceived peer acceptance and competence*

The social acceptance and athletic competence subscales of the Self-Perception Profile for Children (Harter, 1985) assessed perceived peer acceptance and perceived physical ability in physical education, respectively. Each subscale presents 6 items in a structured alternative format in which students first choose which one of two statements describes them better and then if that statement is *really true for them* or *just sort of true for them*. Items are scored from 1 to 4 with higher scores indicating higher or more positive perceptions. Both subscales were contextualized by adding *in PE* to the end of each statement (e.g., "Some kids find it hard to make friends in PE BUT Other kids find it's pretty easy to make friends in PE").

#### *Perceived autonomy*

Six items developed by Hollembeak and Amorose (2005) to capture perceptions of choice and volition in a sport setting measured perceived autonomy. Items were modified to refer to the physical education rather than the sport setting. Students responded to items (e.g., "I have a say in what I do when participating in PE") on a 5-point scale that ranged from *Not at all true for me* (1) to *Completely true for me* (5).

#### *Perceived relatedness*

General feelings of social connections to others (i.e., teachers, peers) within the physical education setting were assessed with a modified version of The Need for Relatedness Scale (Richer & Vallerand, 1998). The scale was modified by changing the stem to read, "In my PE class, I feel..." and the phrase "teacher and classmates" was substituted in items that referred to specific significant others. Students then responded to ten relatedness descriptors (e.g., "supported", "listened to", and "valued") on a 7-point scale ranging from *Strongly disagree* (1) to *Strongly agree* (7).

#### *Self-determined motivation*

Intrinsic motivation, identified regulation, introjected regulation, and external regulation were measured with a modified version of the Academic Self-Regulation Questionnaire (see Goudas, Biddle, & Fox, 1994; see also Ntoumanis, 2005; Standage et al., 2006). The scale begins with the stem, "I take part in PE class..." followed by 16 items (4 items for each type of motivation) reflecting different reasons for participation. Students responded to each item on a 7-point scale ranging from *Strongly disagree* (1) to *Strongly agree* (7). Example items include, "because PE is fun" (intrinsic motivation), "because it is important for me to do well in PE" (identified regulation), "because I would feel bad about myself if I didn't" (introjected regulation), and "because I'll get into trouble if I don't" (external regulation). For the purpose of this study, the self-determination index ( $2 \times$  intrinsic motivation + identified regulation – introjected regulation –  $2 \times$  external regulation; see Standage et al., 2006) was calculated based on the means of the items from each motivation subscale. Relatively self-determined motivation is represented by positive scores on the index, whereas relatively non-self-determined motivation is represented by negative scores.

#### *Enjoyment*

The Sport Enjoyment Scale (Scanlan, Carpenter, Schmidt, Simons, & Keeler, 1993) was modified to assess students' perceptions of having fun engaging in different activities in physical education (e.g., "Do you like playing games in PE?"). Students responded to 4 items on a 5-point scale ranging from *Not at all* (1) to *Very much* (5).

#### *Value*

Four items modified by Xiang, McBride, Guan, and Solmon (2003) for use with elementary physical education students assessed attainment and utility value of physical education. Items were derived from education research on the expectancy-value model (e.g., Eccles, Wigfield, Harold, & Blumenfeld, 1993). Students responded to items (e.g., "For me, being good at activities and games in PE is...", "In general, how useful is what you learn in PE?") on a 5-point scale that ranged from *Not very important* (or *Not useful at all*) (1) to *Very important* (or *Very useful*) (5).

#### *Worry*

The degree to which students are concerned about performing well before and during physical education was assessed with the worry subscale of The Sport-Anxiety Scale-2 (R.E. Smith, Smoll, Cumming, & Grossbard, 2006). The scale's 5 items were modified to refer to the physical education setting (e.g., "I worry that I will mess up during PE class"). Students responded to these items on a 4-point scale ranging from *Not at all* (1) to *Very much* (4).

#### *Effort*

How hard students felt they try in their physical education class was assessed with the 3 effort-related items from the effort-importance subscale of the Intrinsic Motivation Inventory (McAuley, Duncan, & Tammen, 1989). Items were contextualized to physical education (e.g., "I try very hard in this PE class.") and responses ranged on a 7-point scale from *Strongly disagree* (1) to *Strongly agree* (7).

#### *Physical activity*

An overall indicator of students' activity levels was assessed with 5 items from the Physical Activity Questionnaire for Older Children (Kowalski, Crocker, & Faulkner, 1997). Items pertained to the amount of moderate-to-vigorous physical activity students engaged in over the past 7 days after school, in the evening, over

the weekend, during all free time and on each day of the week. Responses are scored on a 5-point scale with higher scores indicating higher activity levels.

Data analysis

Data were screened for univariate and multivariate normality and outliers. Internal consistency reliability (Cronbach's alpha) was calculated for all study variables. Descriptive statistics (i.e., means, standard deviations, and bivariate correlations) were assessed to provide a sample description. Cluster analysis was conducted using teacher support, friendship quality, and peer acceptance to identify physical education relationship profiles. Because cluster analysis is data driven, two approaches were conducted to increase confidence in the profile stability (described in the results section). Profile differences were explored by two one-way MANOVAs using profile groups as the independent variable in both. In the first MANOVA, constructs representing motivation antecedents (i.e., perceived competence, autonomy, relatedness) served as the dependant variables and in the second MANOVA, constructs representing motivation consequences (i.e., enjoyment, value, worry, effort) and self-determined motivation served as the dependent variables. Follow-up between subjects ANOVAs were conducted for significant multivariate effects using a Bonferroni adjustment to help account for stepwise error associated with running multiple univariate analyses. ANOVAs were selected as a follow-up strategy because they provide descriptive information about how the profiles differ from each other, however, they do not account for relationships among dependent variables. In order to address the multivariate nature of the data, discriminant function analysis was also conducted to confirm significant univariate effects. Analyses were completed with SPSS 15.0 (SPSS Inc., Chicago, IL).

Results

Descriptive statistics

All constructs demonstrated good reliability ( $\alpha = .82-.96$ ; see Table 1) including the four subscales used to calculate self-determined motivation (see Table 1 notes). Data screening procedures did not identify any variables as non-normal (skewness/kurtosis > 2), there were five univariate outliers ( $z \geq \pm 3.0$ ) four of which were also identified as multivariate outliers (Mahalanobis  $D^2$  meeting

a  $p < .001$  criterion). Because outliers can have a significant impact on the results, especially in cluster analysis (Hair, Anderson, Tatham, & Black, 1998), analyses were conducted both with and without the outlier cases. Although the cluster patterns were similar, cluster membership changed significantly, therefore, all outliers were removed. Descriptive statistics for study variables appear in Table 1. On average, participants reported moderate to high levels of teacher and peer relationship perceptions. The self-determination index (SDI) average indicated the sample as a whole was more self-determined than not in overall motivation. Participants reported moderate perceptions of competence, autonomy, and relatedness, moderate to high levels of enjoyment, effort, value, and physical activity and moderate to low levels of worry on average. Bivariate correlations were significant ( $p < .05$ ) except for the correlations of friendship quality with SDI and with effort, between teacher support and physical activity, and between autonomy and physical activity. The pattern of correlations among the motivation types was largely consistent with the simplex pattern (R.M. Ryan & Connell, 1989), supporting the use of the SDI.

Cluster analyses

The relationship variables were standardized so that z scores could be used in the cluster analyses. To provide a more stable solution, both hierarchical and non-hierarchical cluster analyses were conducted in a two step approach. First, the hierarchical approach using Ward's linkage method and squared Euclidean distance as the similarity measure was used to determine the most appropriate number of clusters represented in the data. From the hierarchical analysis, agglomeration coefficients were examined and the percentage change in coefficient indicated sizable change of similar magnitude for 2, 3, or 4, profiles. A range of 2-, 3-, and 4-profiles were explored. In considering this range of solutions, the 3-cluster solution was preferred because it resulted in the maximum number of non-redundant profiles with good sample representation (27%, 30%, 42%) in each profile. In the second step, a non-hierarchical k-means cluster analysis was conducted using simple Euclidean distance as the similarity measure. A 3-cluster solution was specified using the initial cluster centers that were generated from the hierarchical cluster analysis. This approach eliminates the case order effect that random cluster centers can produce (Hair et al., 1998). This k-means analysis was conducted on a random selection of half of the cases and then repeated on the remainder of

Table 1  
Descriptive statistics for study variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1 Peer acceptance	.85											
2 Friend quality	.32**	.95										
3 Teacher support	.27**	.30**	.92									
4 Competence	.56**	.23**	.17**	.83								
5 Autonomy	.35**	.17**	.58**	.34**	.84							
6 Relatedness	.56**	.33**	.74**	.45**	.62**	.96						
7 Self-deter. index	.22**	.03	.44**	.39**	.61**	.44**	^					
8 Enjoyment	.34**	.16*	.46**	.56**	.59**	.59**	.69**	.94				
9 Worry	-.43**	-.18**	-.14*	-.54**	-.26**	-.37**	-.25**	-.35**	.93			
10 Effort	.17**	.10	.36**	.39**	.41**	.38**	.48**	.63**	-.20**	.82		
11 Value	.22**	.15*	.48**	.39**	.51**	.46**	.54**	.73**	-.14**	.60**	.90	
12 Physical activity	.23**	.20**	.05	.45**	.11	.24**	.16**	.35**	-.34**	.25**	.26**	.88
Possible range	1-4	1-5	1-5	1-4	1-5	1-7	-18 to 18	1-5	1-4	1-7	1-5	1-5
N	244	244	244	244	244	244	244	243	244	243	243	241
M	3.16	4.33	3.36	2.94	2.97	4.70	1.90	3.91	1.76	5.44	3.41	3.74
SD	.75	.62	1.21	.76	.96	1.62	7.08	1.15	.77	1.55	1.15	.90

Notes. Alpha values on diagonal, ^alpha values for motivation subscales were as follows: intrinsic = .93, identified = .92, introjected = .77, external = .90; correlation values below diagonal, \* $p < .05$  \*\* $p < .01$  (2-tailed), correlations calculated using pairwise deletion of missing data.

the sample. Because the results from the two samples were very consistent in both magnitude and pattern of final cluster centers, the stability of the three profiles is supported. The full sample results are reported. As a descriptive analysis, likelihood ratio chi-square analysis was conducted and confirmed that the profiles did not have an uneven representation of males and females ( $\chi^2_{(2)} = 3.54, p > .05$ ). An ANOVA for grade ( $F(2, 238) = 2.77, p > .05$ ) confirmed no differences in the distribution of cluster membership by grade.

Table 2 contains means, standard deviations, and z scores for each of the profiles. Standardized scores of  $\pm 0.5$  were used as criteria to identify relatively high and low levels of each of the social relationship variables, which help to interpret and label emerging profiles. Labels are used to describe profiles relative to one another and do not always correspond to high and low levels of social relationship variables in absolute terms, though the labels in most cases provide an accurate description of absolute levels of social relationship variables. Fig. 1 depicts each profile using standardized scores.

The first profile was labeled *Positive* ( $n = 103$ ) as it was generally represented by social relationship scores that were either high (teacher support) or showed a trend toward being high (peer acceptance and friendship quality z scores of .47 and .43, respectively). The second profile was labeled *Weak* ( $n = 74$ ) as all social relationship variables were characterized by relatively low scores. The third profile was labeled *Mixed* ( $n = 67$ ) as it was characterized by relatively high scores on peer acceptance, an average level of friendship quality, and relatively low level of teacher support.

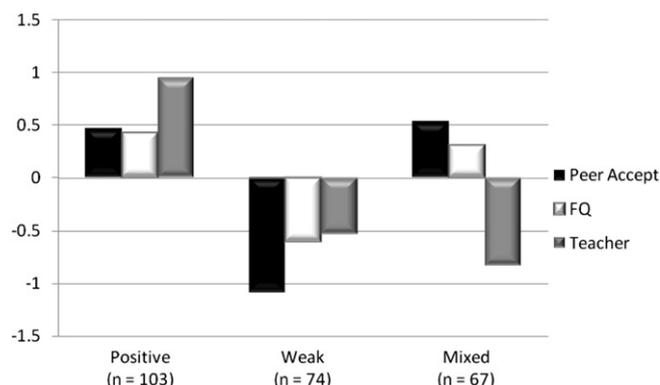
Group difference analyses

The one-way MANOVA with perceived competence, autonomy, and relatedness as the dependent variables was significant (Pillai's Trace = .60,  $F(6, 480) = 34.57, p < .01, \eta^2_p = .30$ ). The between subjects univariate ANOVAs with Bonferroni correction indicated significant ( $p < .01$ ) group differences of moderate magnitude on all dependent variables (see Table 3). Discriminant function analysis confirmed that all three variables significantly differentiated the three profiles. Post hoc pairwise comparisons of the estimated marginal means indicated that the *Positive* and *Weak* profiles differed from one another on all dependent variables. The *Positive* profile was the most adaptive overall, though this profile did not differ from the *Mixed* profile on perceived competence. The *Weak* profile appears to be the least adaptive, with the lowest values of perceived competence and relatedness, although this group did not differ from the *Mixed* group on perceived autonomy.

The one-way MANOVA with SDI, enjoyment, worry, effort, value, and physical activity behavior as the dependent variables was significant (Pillai's Trace = .35,  $F(12, 468) = 8.23, p < .01, \eta^2_p = .17$ ). The between subjects univariate ANOVAs with Bonferroni correction indicated significant ( $p < .01$ ) group differences on all variables (see Table 4). The effect sizes of the univariate follow-ups were generally of moderate magnitude, though worry (.10), effort (.09) and physical activity behavior (.05) constructs were of

**Table 2**  
Participant numbers, means, standard deviations, and standardized scores for relationship profiles resulting from k-means cluster analysis.

Cluster	n	Peer acceptance		Friendship quality		Teacher support	
		M (SD)	z	M (SD)	z	M (SD)	z
Positive	103	3.50 (0.51)	0.47	4.59 (0.38)	0.43	4.51 (0.52)	0.95
Weak	74	2.33 (0.62)	-1.08	3.81 (0.70)	-0.60	2.70 (0.84)	-0.53
Mixed	67	3.55 (0.35)	0.54	4.49 (0.44)	0.31	2.34 (0.79)	-0.83



**Fig. 1.** Results of k-means cluster analysis ( $N = 244$ ).

low magnitude. Discriminant function analysis confirmed that all dependent variables significantly differentiated the three profiles. Post hoc pairwise comparisons of the estimated marginal means were examined to identify group differences. The *Positive* and *Weak* profiles differed significantly on all variables. The *Positive* group had the highest scores on the SDI, enjoyment, effort, and value. The *Mixed* profile did not differ from the *Positive* profile on worry and physical activity, but did not differ from the *Weak* profile on SDI, effort and value. The *Mixed* profile fell in between these two profiles on enjoyment.

Discussion

The aim of this study was to identify naturally occurring profiles of middle school physical education students based on relationship perceptions of teacher support, peer acceptance and friendship quality. The profiles that emerged in this study suggest that these middle school physical education students fell into one of three profiles based on the quality of their relationships with teachers and peers in class. An additional goal was to test for differences among the emergent profiles on their motivational experiences in physical education. The profiles represented by higher values on these relationship variables were expected to report more positive and adaptive motivational experiences. There were significant differences among the different groups of students comprising the three profiles suggesting that certain combinations of relationships coincide with more positive perceptions, affect and behaviors. These findings provide information about social relationships above and beyond the current physical education literature that has supported the individual roles that positive relationships with teachers and peers play in explaining adaptive motivational

**Table 3**  
Univariate F, effect size, and profile means and standard deviations for motivation antecedent variables.

Variable	F (2, 241)	$\eta^2_p$	Cluster		
			Positive (n = 103)	Weak (n = 74)	Mixed (n = 67)
			M (SD)	M (SD)	M (SD)
Competence	24.76**	.17	3.14 (0.68) <sup>a</sup>	2.46 (0.73) <sup>b</sup>	3.17 (0.68) <sup>a</sup>
Autonomy	42.86**	.26	3.55 (0.81) <sup>a</sup>	2.53 (0.81) <sup>b</sup>	2.58 (0.88) <sup>b</sup>
Relatedness	105.80**	.47	5.93 (0.94) <sup>a</sup>	3.39 (1.30) <sup>c</sup>	4.24 (1.38) <sup>b</sup>

Notes. \*\* $p < .01$ ; cluster differences ( $p < .05$ ) based on pairwise comparison of estimated marginal means are indicated by distinct superscripts. Analyses are based on participants with complete data ( $n = 244$ ).

**Table 4**  
Univariate *F*, effect size, profile means and standard deviations for motivation and consequence variables.

Variable	<i>F</i> (2, 238)	$\eta_p^2$	Cluster		
			Positive ( <i>n</i> = 100)	Weak ( <i>n</i> = 74)	Mixed ( <i>n</i> = 67)
			<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )
Self-deter. index	24.05**	.17	5.33 (6.27) <sup>a</sup>	−0.34 (6.68) <sup>b</sup>	−0.78 (6.64) <sup>b</sup>
Enjoyment	28.98**	.20	4.48 (0.71) <sup>a</sup>	3.29 (1.22) <sup>b</sup>	3.75 (1.21) <sup>c</sup>
Worry	13.72**	.10	1.58 (0.62) <sup>a</sup>	2.13 (0.88) <sup>b</sup>	1.62 (0.72) <sup>a</sup>
Effort	11.79**	.09	5.98 (1.30) <sup>a</sup>	4.97 (1.58) <sup>b</sup>	5.14 (1.62) <sup>b</sup>
Value	24.59**	.17	3.97 (0.93) <sup>a</sup>	2.91 (1.07) <sup>b</sup>	3.15 (1.18) <sup>b</sup>
Physical activity	5.91**	.05	3.81 (0.86) <sup>a</sup>	3.45 (0.98) <sup>b</sup>	3.94 (0.81) <sup>a</sup>

Notes. \*\**p* < .01; cluster differences (*p* < .05) based on pairwise comparison of estimated marginal means are indicated by distinct superscripts; analyses are based on participants with complete data (*n* = 241).

experiences in physical education (Cox et al., 2009; Cox & Williams, 2008; Standage et al., 2005). The three profiles that emerged will be described and their relative merits discussed as well as how these findings can inform future research. The motivational experiences of the profiles will be discussed in light of self-determination theory and existing empirical evidence.

The three relationship profiles included a *Positive* profile in which students had relatively positive relationships with their teachers and peers in physical education, a *Weak* profile represented by students with relatively weak relationships with teachers and peers, and a *Mixed* profile characterized by relatively high perceived peer acceptance, an average quality of friendship with their closest friend in class and relatively low perceived teacher support. Not surprisingly, and consistent with study hypotheses, the *Positive* profile reported the most adaptive motivation as evidenced by the highest scores on perceived autonomy, relatedness, self-determined motivation, enjoyment, effort and value. However, the *Mixed* profile did not differ from the *Positive* profile in terms of perceptions of competence, worry and physical activity levels. Therefore, it appears that the combination of relatively high peer acceptance and a trend toward high friendship quality (*M* = 4.49 on a 1–5 scale) may provide some buffering against negative motivational consequences (i.e., lower perceptions of competence, higher feelings of worry) that have been associated with lower perceptions of teacher support in past research (Cox et al., 2009; Cox & Williams, 2008).

The current findings regarding the *Mixed* profile suggest more positive peer relationships have a particularly important association with feelings of greater competence, overall physical activity levels, and low levels of worry in physical education, even in the absence of strong teacher support. The role of peer relationship variables in middle school physical education motivation supports the developmental trend of increased peer influence as students approach early adolescence (Weiss & Stuntz, 2004) as well as a growing body of empirical evidence linking peer relationships to motivation-related variables in the physical domain. Research on peer relationships in physical activity settings has demonstrated a consistent tie between perceived peer acceptance and perceptions of competence (e.g., Ullrich-French & Smith, 2006; Weiss & Duncan, 1992), a moderate negative association between perceived peer acceptance and the degree of worry students have about performing well in class (Cox et al., 2009), and links between a variety of peer-related variables with physical activity behavior (see A.L. Smith & McDonough, 2008). Although the *Mixed* profile appears adaptive relative to some of the outcomes of interest, the negative associations of low teacher support seen in physical education research (Cox et al., 2009; Cox & Williams, 2008) is not

overcome for all outcomes. In fact, the *Mixed* profile also overlaps with the *Weak* profile on several motivation-related constructs (i.e., perceived autonomy, self-determined motivation, effort and value).

Both the *Weak* and *Mixed* profiles include students (58% of sample) that appear to have less than optimal motivational characteristics. Although the *Weak* profile was generally the least adaptive (i.e., lowest scores on perceived competence and enjoyment), it did not differ from the *Mixed* profile in terms of perceived autonomy, self-determined motivation, effort and value. Consistent with research examining the individual roles of teachers and peers in the physical education setting (e.g., Cox et al., 2009), a supportive teacher, which was relatively absent in these two profiles, appears to be linked with more adaptive motivation. For example, Cox et al., found that perceived teacher support was a moderate to strong predictor, perceived peer acceptance a moderate predictor and friendship quality a weak predictor of perceived relatedness and self-determined motivation in middle school physical education students. This study extends these findings by suggesting that a supportive relationship with one's teacher may bear a special responsibility to certain aspects of students' motivation-related experiences in physical education, one that cannot be easily substituted for with good friendships or general feelings of peer acceptance.

The results of this study have important theoretical implications and extend the knowledge base on social relationships and motivation in physical activity settings. Self-determination theory (Deci & Ryan, 1985; R.M. Ryan & Deci, 2007) suggests that social factors will support self-determined motivation and associated positive outcomes to the extent that the basic psychological needs for competence, autonomy, and relatedness are met, a contention that has been consistently supported in physical education research (Cox & Williams, 2008; Ntoumanis, 2001; Standage et al., 2005, 2006; Standage & Gillison, 2007). The current study both supports this body of work and extends these research efforts by examining not only multiple sources of social relationships but also how different combinations of these relationship variables are linked with motivation-related constructs. This approach more closely approximates the social landscape that students are experiencing in physical education. In addition, the findings support youth sport research demonstrating more positive motivational experiences associated with having at least two positive relationship sources (Ullrich-French & Smith, 2006, 2009). Overall, having close, supportive relationships with both teachers and peers yielded the most positive consequences.

The results of this study also appear consistent with an important assertion of attachment theory (Bowlby, 1973). Having a secure attachment relationship enables an individual to develop positive relationship representations that guide future interactions and often translate into positive relationships with others (e.g., friends, romantic partners; see Thompson, 2008). That is, a secure relationship with one's primary care giver is associated with the ability to develop and maintain positive relationships with others whereas an insecure relationship is associated with problems in developing relationships with others (Allen, 2008). If this is the case, we would expect students to have similar quality relationships (i.e., relatively positive or negative) with both teachers and peers, as social functioning should translate across types of relationships. Supporting this contention, most students (73%) in this study were either relatively high on all relationship variables or relatively low on these variables in the profiles that emerged. Similar scores across relationship variables within individuals are also consistent with A.L. Smith et al.'s (2006) research on multiple types of peer relationship variables. In both studies, however, there appears to be a sub-set of youth who report mixed relationship perceptions. More research addressing how these relationships are formed and

maintained is necessary to understand the complex web of one's social network. Future work may also consider the role of parents, as primary attachment figures (Allen, 2008), in the formation of peer and teacher relationships.

Several limitations of this study inspire possible directions for future research. First, cluster analysis is a data driven analytic approach, therefore, although these results provide initial evidence that students experience different combinations of relationships with teachers and peers, the relationship profiles that emerged in this study require further validation. These profiles could be corroborated in a variety of ways including the use of different variables representing social relationships, and/or using different samples. For example, different conceptualizations of teacher and peer relationships could be explored perhaps through the use of parallel instruments that may reveal new insights into the relative contribution of each. Foremost, though, is identifying the most salient aspects of the teacher – student relationship and peer relationships to physical education experiences.

Another limitation is the cross-sectional design of this study which yields only descriptive data about relationships and motivation variables in physical education. This design prohibits any inference about causal relationships among the variables examined. Therefore, it is possible that students with more self-determined motivation and higher enjoyment during class simply have an easier time forming relationships in that setting. Experimental studies are needed to determine if fostering supportive relationships with teachers and peers will lead to more positive physical education experiences. The cross-sectional design also prohibits the examination of developmental trends. Following a cohort of students across the middle school and high school years could help identify developmental differences in relationship salience to a variety of motivational outcomes.

Finally, the real world relevance of the profile differences in this study requires further examination. For example, we do not know if the significant differences in self-determined motivation, enjoyment or self-reported effort evident in this study translate into actual behavioral differences in the physical education setting. Recent research has shown that more self-determined motivation in physical education is related to greater physical activity (i.e., number of steps taken) during structured class and during a free-choice period (Lonsdale, Sabiston, Raedeke, Ha, & Sum, 2009). However, there is still a great need for future research on social factors in physical education to include behavioral indices of motivation. For example, such work may draw upon observation or use of accelerometers to more objectively capture behavioral outcomes and quantify meaningful differences in physical activity.

Although many questions remain about the complex nature of the combined influence of multiple social relationships in physical activity settings, this study does provide a unique window into the roles of teachers and peers in physical education experiences. First, the person-centered cluster analytic approach yielded information about the combinations of relationships that students have with their teacher and peers in physical education. Second, those students with strong relationships with both teachers and peers appeared to have the most positive physical education experiences. Finally, strong peer relationships may buffer against some potentially negative outcomes for those students with lower levels of teacher support, though the causal nature of this relationship was not tested. Overall, differences in motivation-related constructs across combinations of teacher and peer relationships suggest there are some unique and some overlapping functions of specific social relationships. Ideally, researchers will continue to expand the way that social relationships in the physical education context are conceptualized and analyzed providing a richer understanding of students' experiences.

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