

Peers and Teachers as Sources of Relatedness Perceptions, Motivation, and Affective Responses in Physical Education

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Research has demonstrated the importance of relatedness perceptions to self-determined motivation in physical education. Therefore, studies have begun to examine the social factors contributing to feelings of relatedness. The purpose of this study was to examine teacher (perceived emotional support) and peer (acceptance, friendship quality) relationship variables to feelings of relatedness, motivation, and affective responses in junior high physical education students (N = 411). Results revealed that perceived relatedness mediated the relationship between variables and self-determined motivation and related directly to the amount of enjoyment and worry students experienced. These findings demonstrate that relationships with both teachers and peers are important for students' relatedness perceptions, motivation, enjoyment, and worry in physical education.

Key words: friendship, peer acceptance, self-determination theory

A critical objective of physical educators is identifying strategies that will effectively encourage students to participate in regular physical activity (National Association for Sport and Physical Activity, 2004). Recently, researchers delved more deeply into the types of physical education experiences that may cause students to continue physical activity behaviors outside of school. This research showed that students who experience more self-determined motivation in physical education are more physically active during their leisure time (Cox, Smith, & Williams, 2008; Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003). Self-determined motivation in physical education is characterized by participation more for reasons emanating from within the self (e.g., enjoyment, personal importance) than for any external contingencies (e.g., avoiding punishment, to receive a good grade). In addition to being more active during leisure time,

students who reported more self-determined motivation in physical education also exhibited more positive affect, less negative affect, higher concentration, and greater effort during class (Ntoumanis, 2005; Standage, Duda, & Ntoumanis, 2005). These research findings supported self-determination theory, which posits that more self-determined motivation should relate to positive cognitive, affective, and behavioral outcomes (Deci & Ryan, 1985; R. M. Ryan & Deci, 2007).

The importance of self-determined motivation to these outcomes has led researchers to consider the various social factors that may support or undermine motivation. According to self-determination theory (Deci & Ryan, 1985), social factors support self-determined motivation to the extent that they fulfill individuals' basic psychological needs to feel competent (i.e., effective in one's environment), autonomous (i.e., the origin of one's behavior), and related (i.e., socially connected, belonging). Specifically, perceived competence, autonomy, and relatedness are proposed to mediate the relationship between social factors and self-determined motivation and relate indirectly to various consequences or outcomes (e.g., enjoyment; see also Vallerand, 1997). Based on these proposed relationships, researchers interested in how to support self-determined motivation focused their investigations on the social factors most likely to support or impede the satisfaction of these needs.

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Most of the research in physical education centered on social factors that should support feelings of competence and autonomy. Collectively, results demonstrated the importance of students' perceptions of a mastery climate, autonomy support, and choice to their feelings of competence and autonomy in physical education (Cox & Williams, 2008; Ferrer-Caja & Weiss, 2000; Goudas & Biddle, 1994; Ntoumanis, 2001; Standage, Duda, & Ntoumanis, 2003, 2006). Although mastery climate and autonomy support also demonstrated positive relationships with relatedness perceptions (Cox & Williams, 2008; Standage et al., 2006), there has been far less research on the factors most likely to help students feel socially connected during their physical education classes. Identifying factors that may support students' feelings of relatedness is particularly important, as studies have demonstrated that feeling socially connected can be a stronger predictor of self-determined motivation than feelings of competence or autonomy in physical education (Cox & Williams, 2008; Standage et al., 2003).

The social factors examined in association with relatedness perceptions in physical education were mostly limited to students' perceptions of teacher behaviors. Students' perceptions that their teachers emphasized cooperation (Ntoumanis, 2001), offered autonomy support (Standage et al., 2003, 2006) and generally supported opportunities for building social connections in class (Standage et al., 2005) demonstrated positive associations with students' feelings of relatedness in physical education. In addition to these teacher behaviors, both the theoretical and empirical evidence suggests that students' relationships with significant others in school are particularly important to feelings of relatedness and motivation in class. For example, Ryan and Powelson (1991) stressed the importance of close, personal relationships within the school community for helping students internalize (i.e., become more self-determined) their motivation. Further, they emphasized that when students felt connected to and supported by others, their motivation could be maximized because their fundamental need for relatedness was being satisfied. Therefore, students' relationships with teachers and peers in physical education may play a critical role in supporting feelings of relatedness and, indirectly, self-determined motivation.

One aspect of students' relationship with teachers is perceived emotional support that reflects students' perceptions of teacher "caring, friendliness, understanding, dedication, and dependability" (A. M. Ryan & Patrick, 2001, p. 440). Perceived teacher support has demonstrated strong positive associations with feelings of relatedness and motivation in both academic (e.g., Roeser, Midgley, & Urdan, 1996; A. M. Ryan & Patrick, 2001) and physical education settings (Cox & Williams, 2008). Further, Cox and Williams demonstrated that relatedness perceptions partially mediated the relationship between perceived

teacher support and self-determined motivation in middle school physical education.

In addition to the teacher-student relationship, students' social connections with peers may be instrumental in helping them feel a sense of relatedness and self-determination in class. In the developmental psychology literature, two key aspects of peer relationships were identified: perceived peer acceptance (i.e., status, popularity) and friendship quality (i.e., quality of dyadic interactions including supportive functions; Asher, Parker, & Walker, 1996). Research has demonstrated the important role of these peer relationship variables in predicting youths' physical activity motivation and affective responses (A. L. Smith, Ullrich-French, Walker, & Hurley, 2006; Ullrich-French & Smith, 2006). Specifically, these studies showed that greater feelings of acceptance by one's peers and perceptions of higher quality friendships in sport related positively to self-determined motivation and enjoyment and negatively to competitive anxiety (A. L. Smith et al.; Ullrich-French & Smith).

Although the role of peer relationships has received attention in the sport setting, little research has examined the role of peers in physical education or in relationships proposed by self-determination theory (Deci & Ryan, 1985; R. M. Ryan & Deci, 2007). Because self-determination theory proposes that social factors should support self-determined motivation and associated outcomes (e.g., affective responses) to the extent they fulfill the three basic psychological needs, it seems likely that feelings of relatedness explain the associations of perceived peer acceptance and friendship quality to motivation and affective outcomes. In other words, peer relationships should foster self-determined motivation and positive affective experiences in physical education to the extent that they support students' feelings of relatedness in class. Although social supports for feelings of competence and autonomy have received ample research attention, relatively little research has focused on understanding key antecedents of relatedness perceptions in physical education.

Therefore, the purpose of this study was to examine the roles of teacher and peer relationships in explaining relatedness perceptions, self-determined motivation, and positive and negative affective responses (i.e., enjoyment, worry) in physical education. Enjoyment has been shown to be an important outcome of self-determined motivation and partially explains the relationship between motivation in physical education and general physical activity levels (Cox et al., 2008). Worry was also examined as an affective outcome, due to its relevance to peer relationship variables (A. L. Smith et al., 2006) and because there has been little research on how self-determined motivation relates to negative affective responses in physical education. In accordance with self-determination theory, it was hypothesized that perceptions of emotional support from one's teacher, peer acceptance, and friendship quality

would relate positively to self-determined motivation and that feelings of relatedness would mediate these relationships. Further, self-determined motivation was expected to mediate the relationship between relatedness perceptions and enjoyment and worry in physical education. Figure 1 illustrates the direction and sequence of the hypothesized relationships.

Method

Participants and Procedure

On receiving approval from the institutional review board and appropriate school personnel, students in grades 6–8 from a junior high school in the midwestern U.S. were invited to participate in this study. Specifically, they took home a parental consent form and letter describing the study. Students who returned a signed parental consent form had the option to participate. Participants included 179 male and 232 female students ($N = 411$; $Age = 12.27$ years). The sample was mostly Caucasian (83%) and equally distributed across grades 6–8. Students completed an online questionnaire containing measures of study variables and demographic items during regularly scheduled physical education classes.

Measures

Teacher Support. A four-item measure of perceived emotional support modified by Patrick and Ryan (2005; A. M. Ryan & Patrick, 2001) and used in academic settings assessed students' perceptions of how their teacher cared about and understood them as individuals. "PE" was added 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 1

= not at all to 5 = very much. Scale scores received support for construct validity and reliability in classroom settings (Patrick & Ryan; A. M. Ryan & Patrick).

Peer Acceptance. The subscale of the Self-Perception Profile for Children (Harter, 1985) was used to assess perceived peer acceptance in physical education, because it taps into perceptions of popularity or acceptance among one's peers. It presents six items in a structured alternative format, whereby students choose one of two statements that describes them better and then indicate 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 acceptance by one's peers. The scale was 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"). Support for the validity (factorial and construct) and reliability of scale scores has been provided in academic settings (Harter) and studies in which items were modified for physical activity settings (Ullrich-French & Smith, 2006).

Friendship Quality. The Sport Friendship Quality Scale (Weiss & Smith, 1999) was used to assess the quality of each student's relationship with his/her closest friend in physical education class. Specifically, four subscales (i.e., self-esteem enhancement and supportiveness, loyalty and intimacy, things in common, companionship and pleasant play; 16 items total) from this measure were used, because they measure positive aspects of friendship quality. Students responded to items (e.g., "My friend and I can talk about anything") on a 5-point scale ranging from 1 = not at all true to 5 = really true. The mean of the 16 items was used to represent a global index of positive friendship quality. Support for the validity (factorial and construct) and reliability of subscale scores as well as the use of a positive friendship quality index was provided by Weiss and Smith (A. L. Smith et al., 2006; Weiss & Smith, 2002) with youth ages 8–18 years.

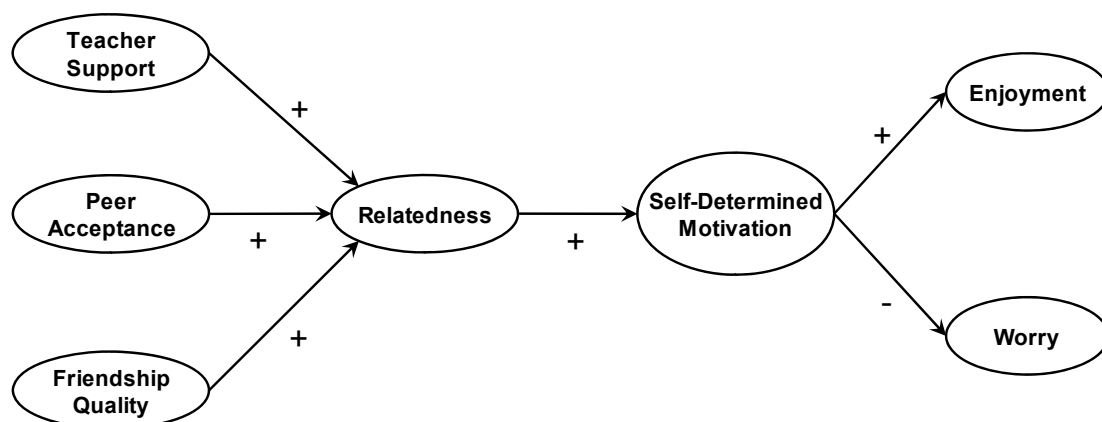


Figure 1. Hypothesized model of the relationships among teacher and peer relationship variables, perceived relatedness, motivation and affect.

Relatedness. The Need for Relatedness Scale (Richer & Vallerand, 1998) was used to assess perceived relatedness in physical education, because it measures general feelings of belonging or social connection. This scale was developed to assess relatedness in the workplace but was modified for the physical education setting. Standage et al., (2003, 2006) provided support for construct validity and reliability of scale scores with physical education students. Similar to the work of Standage and colleagues¹, the stem was modified for the physical education context to read, "In my PE class, I feel..." The stem was followed by 10 items (e.g., supported, listened to, and valued) to which students responded on a 7-point scale ranging from 1 = strongly disagree to 7 = strongly agree.

Self-Determined Motivation. The Perceived Locus of Causality scale (Goudas, Biddle, & Fox, 1994) was used to assess self-determined motivation, because it measures four types of motivation regulation in physical education: intrinsic motivation, identified regulation, introjected regulation, and external regulation. The scale began with the stem, "I take part in PE class..." followed by reasons reflecting four types of motivation (four items each). Examples from most to least self-determined forms of motivation included, "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). Students responded to each item on a 7-point scale ranging from 1 = strongly disagree to 7 = strongly agree. Physical education research has supported the reliability and validity (construct, factorial) of these subscale scores (Goudas et al., 1994; Ntoumanis, 2001; Standage et al., 2006). Mean scores from each subscale were used to calculate a self-determination index based on the position along the self-determination continuum: 2 x intrinsic motivation + identified regulation - introjected regulation - 2 x external regulation (see Standage et al.). Positive scores reflect relatively self-determined motivation, whereas negative scores reflect relatively nonself-determined motivation.

Affective Responses. Enjoyment and worry were assessed to capture positive and negative aspects of students' affective experiences. The Sport Enjoyment Scale (Scanlan, Carpenter, Schmidt, Simons, & Keeler, 1993), which measures perceptions of fun and happiness, was modified to assess students' enjoyment of physical education activities. Modifications consisted of replacing references to sport with examples of the different activities in which students participated during physical education (e.g., "Are you happy doing physical activities in PE?"). Participants responded to four items on a 5-point scale ranging from 1 = not at all to 5 = very much. Construct validity and reliability of scale scores have been supported in the youth sport setting (Scanlan et al., 1993) and when modified for physical education (Cox et al., 2008). The

worry subscale (five items) of The Sport-Anxiety Scale-2 (R. E. Smith, Smoll, Cumming, & Grossbard, 2006) was modified to assess the extent students worried before and during physical education; the items measure doubt and concern about performing or doing well. Again, references to sport were replaced with references 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 1 = not at all to 4 = very much. Smith and colleagues supported the reliability and validity (construct and factorial) of subscale scores for use with youth sport participants (i.e., 10–14-year-olds).

Data Analysis

Descriptive statistics included means, standard deviations, bivariate correlations, and internal consistency reliabilities for the items on each scale. Structural equation modeling using Lisrel 8.71 (Scientific Software International Inc., Chicago, IL) and maximum likelihood estimation was used to test the main study hypotheses. The observed variables for each latent construct in the model were represented by item parcels. Parcels are more reliable, less likely to violate distributional assumptions, and less likely to return biased parameter estimates compared to single-item indicators (Little, Cunningham, Shahar, & Widaman, 2002). However, they should be used only when the underlying structure of constructs is well defined. Each parcel reflected the mean of 2–4 items (see Table 1) depending on the number of items in the scale. For example, for peer acceptance, the first two items were averaged to form the first parcel, the next two formed the second, and the final two formed the third (see Ntoumanis, 2001). The item parcels were screened for univariate and multivariate normality and were examined in the measurement model prior to testing the structural models.

We tested the hypothesized mediated relationships by comparing the fit of a full mediation model (see Figure 1) to an alternative model that contained: (a) direct relationships from teacher and peer relationship variables to self-determined motivation, and (b) direct relationships from perceived relatedness to enjoyment and worry in addition to the hypothesized relationships. This procedure was consistent with current recommendations for testing mediated relationships (see Frazier, Tix, & Barron, 2004). Full mediation is supported if: (a) all the direct and indirect relationships in the mediation model are significant, and (b) the alternative model fails to provide a significantly better data fit. However, if the alternative model provides a better data fit, then the direct and indirect relationships are examined to determine if partial mediation (i.e., significant direct and indirect effects) or no mediation (i.e., only significant direct effects) occurs.

Absolute (χ^2 value, goodness of fit [GFI]) and incremental (comparative fit index [CFI]) fit indexes as

well as the magnitude of residuals (root mean squared error of approximation [RMSEA], Standardized Root Mean Square Residual [SRMR]) were used to assess model fit. A RMSEA value less than .08, a SRMR value less than .05, and values of $\geq .90$ for GFI and CFI suggest a good fit between the model and data² (Byrne, 1998). A significant difference ($p < .01$) in the χ^2 value between

competing nested models was used to determine which best fit the data. In addition to these, the strength and direction of path coefficients and variance explained in the dependent variables were considered in assessing the overall model validity (Marsh, Hau, & Wen, 2004).

Results

Descriptive statistics (see Table 2) showed moderate to strong positive relationships among most study variables. Exceptions included the small to moderate negative relationships between worry and remaining study variables. In addition, there were low to moderate associations among the three relationship variables. Means revealed students felt supported by their teachers, accepted by their peers, and the quality of their closest friendships in physical education was high. Their general feelings of relatedness were moderately high; they reported having fun in class and did not experience much worry or concern about doing well. Finally, their motivation was relatively self-determined (i.e., mean score was positive), although scores were low, indicating students rated nonself-determined reasons for participation almost as strongly as self-determined reasons³. Cronbach's alpha coefficients reflected acceptable internal consistency reliability among the items on each scale (i.e., $> .76$).

Screening of item parcels showed some values for univariate skewness (range = -1.6–1.2) and kurtosis (range = -0.8–3.1) were significant ($p < .001$). However, values fell within an acceptable range, and significant values for skewness and kurtosis do not make a substantive impact on the main analyses with large samples (i.e., > 200 cases; Tabachnick & Fidell, 2007). Standardized values for multivariate skewness (23.32) and kurtosis (14.90) were significant ($p < .01$). However, the maximum likelihood estimation has been shown to be less sensitive to this degree of nonnor-

Table 1. Measurement model statistics

Item parcel	# Items ^a	Load. λ	Unique. Δ
Teacher support A	2	.91	.17
Teacher support B	2	.96	.08
Peer acceptance A	2	.73	.47
Peer acceptance B	2	.71	.49
Peer acceptance C	2	.83	.31
Friendship quality A	4	.84	.30
Friendship quality B	4	.88	.23
Friendship quality C	4	.88	.23
Friendship quality D	4	.84	.30
Relatedness A	3	.91	.16
Relatedness B	3	.94	.13
Relatedness C	2	.92	.15
Relatedness D	2	.86	.26
Self-determined motiv. A ^b	—	.91	.17
Self-determined motiv. B ^b	—	.93	.14
Enjoy A	2	.93	.14
Enjoy B	2	.99	.03
Worry A	3	.90	.19
Worry B	2	.98	.05

Note. Load. = loading; Unique. = uniquenesses

^aThe number of items averaged to form each parcel.

^bThe self-determined motivation parcels were each calculated with the average of 2 of the items from each of the four motivation subscales using the following formula: (2*intrinsic motivation) + identified regulation - introjected regulation - (2*external regulation). Loadings are from the completely standardized solution; All loadings are significant ($p < .01$).

Table 2. Descriptive statistics, correlations, and Cronbach's alpha coefficients ($N = 411$)

Variable ^a	Range	1	2	3	4	5	6	7
1. Teacher support	1–5	.91						
2. Peer acceptance	1–4	.23	.77					
3. Friendship quality	1–5	.31	.37	.93				
4. Relatedness	1–7	.73	.51	.44	.96			
5. Self-determ. motiv.	-18–18	.48	.23	.16	.54	—		
6. Enjoyment	1–5	.45	.40	.31	.63	.69	.94	
7. Worry	1–4	-.16	-.47	-.26	-.39	-.32	-.42	.92
<i>M</i>		3.66	3.09	4.23	4.79	1.53	3.96	1.83
<i>SD</i>		1.16	0.69	0.67	1.51	6.48	1.09	0.81

Note. Self-determ. motiv. = self-determination motivation; *M* = mean; *SD* = standard deviation; alpha coefficients are presented along the diagonal in bold.

^aAll variables are measures of perceptions. All correlations are significant ($p < .01$).

malinity compared to other estimation procedures and is recommended under such circumstances (Hu & Bentler, 1998; see also Ntoumanis, 2001; Standage et al., 2005). Structural equation modeling results revealed a good fit between the measurement model and the data ($df=131$, $\chi^2=275.44$, $p<.01$; GFI = .93; CFI = .99; RMSEA = .05; SRMR = .04). For the main analyses, the full mediation model was tested first and demonstrated a reasonable fit to the data ($df=143$, $\chi^2=527.36$, $p<.01$; GFI = .87; CFI = .97; RMSEA = .09; SRMR = .10), although several fit indexes did not meet the minimum criteria. In this model, all relationships were significant and in anticipated directions.

Next, the alternative model was tested and showed a significantly better fit to the data ($\Delta df=5$, $\Delta\chi^2=118.65$, $p<.01$; GFI = .90; CFI = .98; RMSEA = .07; SRMR = .07). In this model, the direct relationships between the teacher and peer relationship variables and motivation were non-significant ($p>.05$), suggesting their relationships with motivation were fully mediated by feelings of relatedness. However, the direct relationships between relatedness perceptions and enjoyment and worry were significant ($p<.01$). These relationships, coupled with the significant indirect relationship between relatedness perceptions and enjoyment, suggested the relationship between perceived relatedness and enjoyment was partially mediated by self-determined motivation. On the other hand, perceived relatedness did not relate indirectly to worry, suggesting this relationship was direct and not mediated by motivation. The nonsignificant relationships in the alternative model were dropped, resulting in a final model that fit the data well ($df=142$, $\chi^2=421.96$, $p<.01$; GFI = .90; CFI = .98; RMSEA = .07; SRMR = .07). Figure 2 illustrates the standardized direct paths in this final model, and Table 3 contains the standardized indirect paths in the final model. The final model explained 78% of the variance in relatedness perceptions, 33% in self-determined motivation, 69% in enjoyment, and 20% in worry.

Discussion

This study explored the social relationship variables likely to fulfill students' need for relatedness and indirectly explain self-determined motivation, enjoyment, and worry in physical education. This aim stemmed from a need to consider the ways students may feel socially connected in class in light of the relatively stronger research emphasis on factors supporting competence and autonomy perceptions (e.g., Standage et al., 2003, 2006). In support of study hypotheses and self-determination theory (Deci & Ryan, 1985), feelings of relatedness mediated the relationship between peer and teacher relationship variables and self-determined motivation in physical education. This finding suggests that perceptions of support and acceptance among one's teachers and peers contribute to students' feelings of self-determination during physical education, because they feel socially connected within that setting.

Table 3. Standardized indirect effects

Path	Effect
Teacher support → Motivation	.38**
Peer acceptance → Motivation	.22**
Friendship quality → Motivation	.05*
Teacher support → Enjoyment	.46**
Peer acceptance → Enjoyment	.26**
Friendship quality → Enjoyment	.06*
Teacher support → Worry	-.29**
Peer acceptance → Worry	-.17**
Friendship quality → Worry	-.04*
Relatedness → Enjoyment	.32**

Note. Motivation refers to self-determined motivation index.
* $p<.05$.
** $p<.01$.

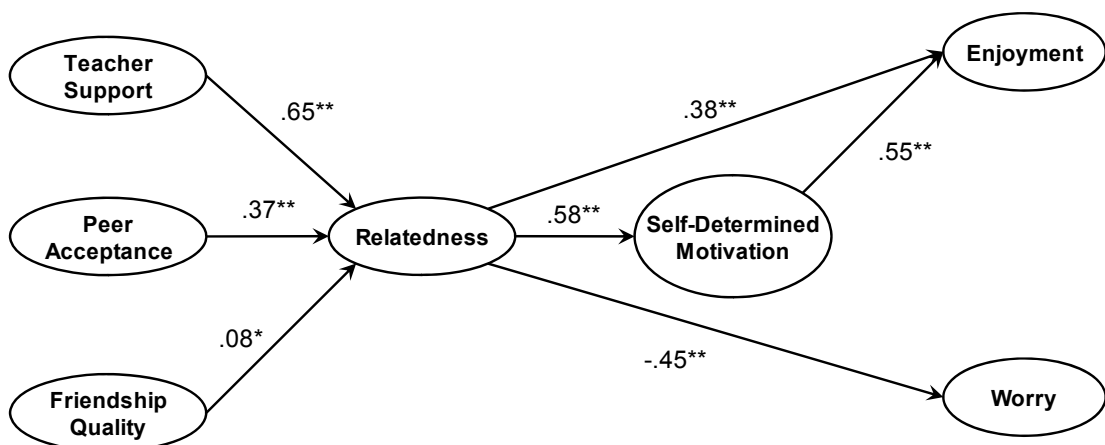


Figure 2. Final model. Path coefficients are from the completely standardized solution. For simplicity, the observed indicators are not shown in this model. * $p<.05$; ** $p<.01$.

Specifically, students who felt their teacher demonstrated more emotional support, felt more accepted by their peers, and had a higher quality close friendship in class experienced greater feelings of belonging in general and were more self-determined in their motivation. The motivational role of teacher support is consistent with past research in physical education (Cox & Williams, 2008) and academic classroom settings (e.g., Roeser et al., 1996). This study also extends past work by demonstrating that students' relationships with their teachers are more important than their peer relationships for motivational experiences in physical education. A potential explanation for this greater motivational relevance could stem from the amount of information teachers communicate about the usefulness and importance (i.e., value) of physical education activities compared to peers. Close relationships with significant others help individuals internalize the values imparted by those individuals and become more self-determined in their motivation (R. M. Ryan & Powelson, 1991). Therefore, if teachers communicated more information about the value of physical education compared to one's peers, it might help explain why they play a greater role in fostering students' feelings of self-determination in class. Future research is needed to explore this possibility.

In terms of peer relationships, the general degree of acceptance students felt among their peers was more important than the quality of their closest friendship in class to their overall feelings of relatedness and motivation. This was consistent with other peer relationship research in youth physical activity settings demonstrating greater associations of perceived peer acceptance to perceived competence, self-presentational concerns, enjoyment, stress, and anxiety (A. L. Smith et al., 2006; Ullrich-French & Smith, 2006). The greater importance of general feelings of belonging among one's peers informs the development of effective strategies to increase relatedness perceptions in class. Specifically, students may benefit from more opportunities to interact and form relationships with many different students as well as creating an atmosphere of acceptance and mutual respect.

Contrary to hypotheses, self-determined motivation did not mediate the relationship between relatedness perceptions and enjoyment and worry in physical education. Motivation only partially mediated the relationship between relatedness perceptions and enjoyment and did not mediate its relationship to worry in physical education. Vallerand's (1997) hierarchical model of intrinsic and extrinsic motivation suggested that need fulfillment should relate directly to motivation and indirectly to affective consequences. Although the results were not consistent with this proposed relationship sequence, they supported the basic needs subtheory of self-determination theory, which suggests need fulfillment is important for both self-determined motivation and other well being indexes,

such as positive affect (R. M. Ryan & Deci, 2007). In addition, other research in physical activity settings yielded similar findings, showing need fulfillment has both direct and indirect relationships to positive and negative affect (Cox & Williams, 2008; McDonough & Crocker, 2007). However, it should be noted that including the direct path between relatedness and enjoyment and eliminating the path between self-determined motivation and worry in the final model may have been driven by the sample that was examined and requires further testing.

Several limitations of this study deserve consideration in future research on physical education motivation. One was our use of a variable-centered approach in data analysis. This approach offers information about how variables generally relate to one another but may not represent students' true experiences in physical education. For example, research using a person-centered approach (i.e., cluster analysis) has identified combinations of peer relationships or relationship profiles among youth sport participants (A. L. Smith et al., 2006). The profiles that emerged differed on peer acceptance, positive friendship quality, and friend conflict variables, and these differences distinguished the groups on motivation-related experiences such as perceived competence, enjoyment, and self-determined motivation. It would be interesting to use a similar approach when considering teacher and peer relationships in physical education to see what different relationship profiles emerge and whether they differ on key motivational constructs (e.g., need satisfaction, self-determined motivation, affect) in physical education.

Another limitation of the current study was the cross-sectional design, which only allowed for conclusions to be drawn about the associations among the variables at one point in time. Although this design was appropriate for investigating the roles of teacher and peer relationship variables in physical education motivation, a longitudinal approach would allow researchers to address additional questions. For example, examining these variables across the middle and high school years would yield information about how the relative importance of social connections with teachers and peers to motivation-related experiences may change. Peer importance tends to peak during adolescence (see Brustad & Partridge, 2002). Therefore, we might expect to see increases in the importance of perceived peer acceptance as children progress through adolescence. Two final limitations include the need for more validity evidence for scores from several measures that were not previously modified for physical education (e.g., peer acceptance, worry) and the absence of a measure of actual behavior. Both limitations need to be addressed in future research on physical education motivation.

Interest in examining self-determination theory (Deci & Ryan, 1985) for understanding motivation in physical education has increased substantially and, with it, a focus on social factors that may support or undermine

self-determined motivation. The results of this study supplement the knowledge base on how to support feelings of competence and autonomy by illustrating the important roles relationships with teachers and peers play in helping students feel socially connected in class. Although the relationship with one's teacher appears to be more important as children approach adolescence, strategies designed to foster relationships with teachers and peers may help students feel a greater sense of belonging and self-determination in their physical education class.

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Notes

1. Standage et al. (2003, 2006) has used similarly modified versions of this scale. In these versions, the stem has

been modified to read, “With the other students in my PE class I feel...”. Thus, perceived relatedness is assessed as perceptions of social connections with one's peers in physical education. In the current study, the stem did not refer to specific significant others so that the items tapped into general feelings of relatedness without defining the source of these feelings (e.g., peers or teachers).

2. Although Hu and Bentler (1999) recommended that GFI and CFI values greater than .95 indicate a good-fit between the hypothesized model and the data, more recent commentary has suggested that these criteria are too stringent (Marsh et al., 2004). Therefore, we chose to use a number of ways to assess the validity of the models tested including the criteria set forth by Byrne (1998) when evaluating the fit indices.

3. An anonymous reviewer inquired about how the magnitude of students' scores on the self-determination index compared to other studies. Students' scores in this study appear to be lower compared to similar samples. For example, Standage et al. (2006) reported a mean of 3.34 with aged physical education students of similar ages.

Authors' Notes

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