

The Roles of Perceived Teacher Support, Motivational Climate, and Psychological Need Satisfaction in Students' Physical Education Motivation

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Research illustrates the positive roles of perceived competence, autonomy, and mastery climate and the negative role of performance climate in student motivation in physical education. Less research has examined perceptions of relationships within this setting (i.e., perceived teacher support and relatedness) and their role in student motivation. The purpose of this study was to test the mediating roles of perceived competence, autonomy, and relatedness in the relationship between social contextual factors and motivation in physical education students ($N = 508$). Results from structural equation modeling showed that perceived competence, autonomy, and relatedness partially mediated the relationship between perceived teacher support and self-determined motivation and that mastery climate related directly to self-determined motivation. The results highlight the importance of perceived teacher support, mastery climate, and relatedness to motivation in physical education.

Keywords: relatedness, belonging, autonomy, competence, self-determination theory

Physically educated students participate in regular physical activity and value physical activity for its inherent enjoyment and challenge (National Association for Sport & Physical Education, 2004). These characteristics are consistent with experiencing self-determined motivation or participating in physical activity more for internal than external reasons (see R.M. Ryan & Deci, 2000). Specifically, students whose motivation is relatively self-determined are more likely to engage in activities because they are fun (intrinsic motivation) and personally important

(identified regulation) and less apt to engage in activities to gain approval and avoid feelings of guilt (introjected regulation) or to gain rewards separate from the activity itself (external regulation). These reasons represent different types of motivation that fall along a continuum of self-determination ranging from most self-determined (intrinsic motivation) to most controlling or non-self-determined (external regulation).

According to self-determination theory (R.M. Ryan & Deci, 2000, 2007), students with more self-determined motivation will demonstrate greater persistence, effort, and enjoyment than students with less self-determined motivation. In the physical education setting, more self-determined students report stronger intentions to participate in physical activity, are more likely to participate in optional physical education in the future, and are more physically active during leisure time (Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003; Ntoumanis, 2001, 2005; Standage, Duda, & Ntoumanis, 2003). Thus, promoting self-determined motivation in physical education may support the integration of physical activity behaviors acquired in physical education into future physical activity pursuits and daily living outside of school.

Students will experience self-determined motivation within a specific setting to the extent that they satisfy the fundamental needs for competence, autonomy, and relatedness (R.M. Ryan & Deci, 2000, 2007). Ample research in sport (e.g., Hollembek & Amorose, 2005; Reinboth, Duda, & Ntoumanis, 2004; Sarrazin, Vallerand, Guillet, Pelletier, & Cury, 2002) and physical education (Ntoumanis, 2001, 2005; Standage et al., 2003; Standage, Duda, & Ntoumanis, 2006) has shown that greater satisfaction of these three needs is related to more self-determined motivation. Self-determination theory (R.M. Ryan & Deci, 2007) also emphasizes the critical role of the social context in either enhancing or impeding self-determined motivation through perceptions of competence, autonomy, and relatedness. A growing number of studies have examined the relationships among various social-contextual factors, need satisfaction, and motivation; however, few have systematically tested the mediating roles of perceived competence, autonomy, relatedness.

Researchers in physical education have emphasized the importance of the social context via mastery and performance motivational climates (Ames, 1992; Goudas & Biddle, 1994). Mastery climates are characterized as environments in which students perceive they are rewarded for personal improvement and learning, whereas performance climates are those in which students perceive that superior performances are rewarded. It is possible for students to perceive an environment in which they are rewarded for both (Ferrer-Caja & Weiss, 2000; Standage et al., 2003). Mastery climates are thought to promote feelings of competence, autonomy, and relatedness, and thus support self-determined motivation (Ames, 1992). In contrast, performance climates are thought to provide fewer opportunities to feel competent and autonomous and thus undermine self-determined motivation.

Although researchers have not specifically tested the mediating roles of perceived competence, autonomy, and relatedness in the relationship between motivational climate and motivation, there is support for the relationships among these variables. In physical education and youth sport settings, mastery climate has related positively to perceived competence (Ferrer-Caja & Weiss, 2000; Goudas & Biddle, 1994; Reinboth et al., 2004), autonomy (Ferrer-Caja & Weiss, 2000; Standage et al., 2003), self-determined motivation (Cury et al., 1996; Standage et al., 2003),

and, to a lesser extent, relatedness (Sarrazin et al., 2002). Performance climate has either related negatively or not at all to need satisfaction within these settings (e.g., Cury et al., 1996; Goudas & Biddle, 1994; Sarrazin et al., 2002; Standage et al., 2003). Despite weak support for the relationships between performance climate and need satisfaction, stronger performance climates have consistently shown negative relationships with intrinsic motivation (e.g., Cury et al., 1996).

Although physical education research has examined aspects of the social context that are particularly important for predicting students' feelings of competence and autonomy (e.g., motivational climate, feedback, autonomy support), far less is known about social factors that support feelings of relatedness specifically. One such factor is students' perceptions of their relationships with their teachers, which are both motivationally relevant (see A.M. Ryan & Patrick, 2001; R.M. Ryan & Powelson, 1991) and under-studied in the physical education setting. Teachers can create meaningful connections with their students by demonstrating emotional support or involvement, which consists of "caring, friendliness, understanding, dedication, and dependability" and "refers to the extent to which students believe teachers value and establish personal relationships with them" (A.M. Ryan & Patrick, 2001, p. 440). In education research, this has been referred to as perceived teacher support (Patrick & Ryan, 2005; A.M. Ryan & Patrick, 2001). Research has supported the positive relationship between perceptions of support and perceived relatedness in both academic and sport settings (Gagne, Ryan, & Bargmann, 2003; Reinboth et al., 2004; Roeser, Midgley, & Urdan, 1996).

In addition to supporting feelings of relatedness, attachment theory (Bowlby, 1988) proposes that when individuals have secure relationships, they are more likely to explore their environment with confidence and security, thus enhancing their feelings of competence and autonomy (see Grossmann, Grossmann, & Zimmerman, 1999; Soares, Lemos, & Almeida, 2005). Positive relationships among perceived support, competence, and autonomy in academic and sport settings support this contention (e.g., Gagne et al., 2003; A.M. Ryan & Patrick, 2001). Most notably, Gagne, Ryan, and Bargmann (2003) found that adolescent gymnasts who experienced more support from their coach not only felt more socially related but also more competent, autonomous, and self-determined in their motivation. Gagne et al.'s work suggests that feelings of competence, autonomy, and relatedness may mediate the relationship between perceived support and motivation.

The purpose of this study was to extend motivation research in the physical education setting and the application of self-determination theory by testing the mediating roles of perceived competence, autonomy, and relatedness in the relationships of perceived teacher support and motivational climate to self-determined motivation. We hypothesized that mastery climate and teacher support would relate positively, whereas performance climate would relate negatively to perceived competence, autonomy, and relatedness and self-determined motivation. Further, we predicted that perceived competence, autonomy, and relatedness would relate positively to self-determined motivation and mediate the relationships between social contextual factors and self-determined motivation. That is, social-contextual factors were expected to relate directly to need satisfaction and indirectly to self-determined motivation. Support for the indirect relationships would be evidenced by nonsignificant direct relationships between social-contextual factors and self-determined motivation when controlling for need satisfaction.

Method

Participants

Male ($n = 225$) and female ($n = 289$) fifth- and sixth-grade students ($N = 518$; 4 did not report gender) in the Midwestern part of the United States ($M_{\text{age}} = 11.38$ years; $SD = 0.68$) participated in this study.¹ The inclusion of fifth- and sixth-grade students extends past research that has tested similar models of motivation primarily with older adolescents (e.g., Hollembeak & Amorose, 2005; Ntoumanis, 2001; Reinboth et al., 2004; Standage et al., 2003, 2006). Eighty-two percent were White followed by Other² (5.8%), Latino (5.4%), Black (2.5%), American Indian² (2.3%), and Asian (.8%; 6 participants did not report race). Fifth-grade students participated in compulsory physical education at least once a week for the entire school year, whereas sixth-grade students participated in compulsory physical education five times per week for at least half of the school year.

Measures

Participants completed a multiform questionnaire including measures of each variable and demographic information. Elementary and middle school physical education teachers assisted with the validation of the modified measures within the questionnaire by evaluating the readability and relevance of the items for this age group and setting.

Motivational Climate. Two subscales from the Perception of Motivational Climate Scale (PMCS; Biddle et al., 1995) were used to assess perceptions of mastery and performance climates. One subscale, Promotion of Learning by Teacher (four items), reflects a mastery climate (e.g., “In my PE class, the PE teacher is pleased when each student learns something new”). The other, Promotion of Comparison by Teacher (three items), reflects a performance climate (e.g., “In my PE class, the PE teacher particularly appreciates those who win”). The word *pupils* was replaced with *students* to make the PMCS more appropriate for a sample in the United States. Participants responded on a 5-point scale ranging from *Don't agree at all* (1) to *Agree completely* (5). Both subscales have demonstrated adequate internal consistency, factorial, and construct validity in samples of young adolescent (i.e., 12–14 years) British students (Biddle et al., 1995; Standage et al., 2003).

Perceived Relatedness and Teacher Support. Participants completed a modified version of the Psychological Sense of School Membership Scale (PSSMS; Goodenow, 1993b) that was developed for middle school students. Although Goodenow (1993b) has treated the PSSMS as a unidimensional scale to assess perceived belonging, recent research in the sport context (Allen, 2006), consistent with early development of the PSSMS (Goodenow, 1993a), has supported the use of only some of the items to assess perceived relatedness. Other items, pertaining specifically to one's coach/teacher, reflect perceived support (e.g., “The teachers here respect me” and “Most teachers at [name of school] are interested in me”) and did not load with the relatedness items in Allen's investigation. Sixteen of the 18 items³ from Goodenow's (1993b) scale were modified (e.g., “I am included in lots of activities at [name of school]” was changed to “I am included in lots of activities

in my P.E. class”) to provide an initial examination of the factorial and construct validity of the PSSMS for assessing perceived relatedness and teacher support in the physical education setting. Participants responded to these items on a 5-point scale ranging from *Not at all true of me* (1) to *Very true of me* (5).

Perceived Competence. Harter’s (1985) scale of athletic competence for children was modified to assess perceived physical competence in physical education class. The 6-item scale is designed to measure children’s perceptions of how good they are (i.e., ability) at sport and other physical games and utilizes a structured alternative format to reduce social desirability bias. Participants first chose which of two statements best describes him or her and then whether that statement is *sort of true* or *really true* for him or her. Each item is then scored on a scale from 1 to 4, with 1 representing low perceived competence and 4 representing high perceived competence. The scale was contextualized by adding the phrase *in PE* to the end of each item. After consulting with the physical education teachers, the term *physical activities* was substituted for *sports* in Item 3 to reflect the full range of activities that students engage in during physical education. There has been support for the internal consistency and validity of this scale in third- through eighth-grade students (Harter, 1985) and with similarly modified versions in the physical education setting (e.g., Ridgers, Fazy, & Fairclough, 2007).

Perceived Autonomy. Five items were used to measure students’ perceptions of choice and freedom of action in physical education class (see Standage et al., 2003, 2006). The scale begins with the question, “How do you feel about being in your PE class?” and examples of items that follow include, “I can decide which activities I want to practice” and “I have a say regarding what physical activities I want to do.” Participants responded to the items on a 5-point scale ranging from *Strongly disagree* (1) to *Strongly agree* (5). Standage et al. (2003, 2006) demonstrated good internal consistency and construct validity of this scale in their recent work with young adolescents (11–14 years) in physical education.

Motivation. The Academic Self-Regulation Questionnaire (R.M. Ryan & Connell, 1989) was modified to assess self-determined motivation in the physical education setting. Specifically, three of the four original stems asking participants why they engage in different classroom-typical behaviors were modified for the physical education setting. The modified stems included, “Why do I participate in the physical activities in PE?”, “Why do I try hard in PE?”, and “Why do I try to do well in PE?” The fourth original stem, “Why do I do my homework?”, was not modified for this study because only motivation within the physical education setting was assessed. Each stem is followed by eight reasons that one might engage in these behaviors, for a total of 24 items. These different reasons reflect the four different types of motivation (intrinsic motivation, identified, introjected, and external regulation; 6 items for each type). Examples of the reasons that followed these stems include, “Because it’s fun” (intrinsic), “Because I want to learn new things” (identified), “Because I feel disappointed with myself when I don’t try” (introjected), and “So that the PE teacher won’t yell at me” (external). Participants responded to items on a 4-point scale ranging from *Not at all true* (1) to *Very true* (4). Ryan and Connell supported the construct validity of this scale with multiple samples of children in Grades 3 through 12, and the internal consistency reliabilities of these subscales

similarly modified has ranged from .68 (introjected regulation) to .89 (Standage et al., 2006) in the physical education setting. The items from these four subscales were used to calculate an index of motivation reflecting degree of self-determination based on the position of the four types of motivation on the self-determination continuum; that is, $(\text{Intrinsic motivation} \times 2) + \text{Identified regulation} - \text{Introjected regulation} - (\text{External regulation} \times 2)$. Positive scores reflect relatively self-determined motivation, whereas negative scores reflect relatively non-self-determined motivation (potential range = -9 to 9).

Procedures

With approval from educational personnel, the first author met with students to explain the purpose of the study and invite them to participate. Letters to parents and parental consent forms were sent home with all fifth- and sixth-grade students at seven elementary and five middle schools from two neighboring school corporations. During a second meeting, students who returned a signed parental consent form (approximately 50%) had the opportunity to participate in the study. The first author explained the confidential and voluntary nature of the study, gave instructions, and read all items aloud while the students followed along completing their own questionnaire. All questionnaires were completed between February and April when all students had attended their physical education class for at least 12 weeks.

Data analysis

Prior to running the main analyses, a principal axis factor analysis was conducted to examine the factor structure of the PSSMS (Goodenow, 1993b). Next, descriptive statistics were generated for all study variables, including means, standard deviations, correlations, and scale reliabilities. Structural equation modeling using LISREL 8.71 (Joreskog & Sorbom, 2004) with maximum likelihood estimation was used to address the main study purpose. First, the measurement model was examined to assess the relationships between the observed indicators and their respective latent constructs. The observed indicators were represented by two random aggregates or parcels created from the items of each scale. With the exception of self-determined motivation, these were generated by randomly selecting half of the items from each scale and then calculating the mean to represent the first item parcel. The mean of the remaining items was used to represent the second item parcel. In the case of self-determined motivation, two observed indicators were created by randomly selecting half of the items from each motivation subscale to calculate one self-determination index and then using the remaining items to calculate a second index (see Sarrazin et al., 2002, and Standage et al., 2006, for similar examples). The use of item parcels is acceptable when the set of parcels reflects a unidimensional factor structure (Hagtvet & Nasser, 2004). Parcels tend to be more reliable and normally distributed and produce more parsimonious models compared with single-item indicators (Little, Cunningham, Shahar, & Widaman, 2002).

To address the main study purposes, the recommendations of James, Mulaik, and Brett (2006) for testing mediation using structural equation modeling were followed. First, a baseline model was tested in which the only relationships between social contextual factors and self-determined motivation were indirect through

need satisfaction (i.e., a full mediational model). Next, the fit of this model was compared with an alternative model in which there were both direct and indirect (i.e., through need satisfaction) paths between social contextual factors and self-determined motivation. Full mediation is supported if (a) all of the direct and indirect relationships in the baseline model are significant and (b) the alternative model fails to provide a significantly better fit to the data. If the fit of the two models is not significantly different, the baseline model is accepted based on the principle of parsimony (see Hollembek & Amorose, 2005; Standage et al., 2006). However, if the alternative model provides a better fit to the data, then the direct and indirect relationships between social contextual factors and motivation are examined to determine whether partial mediation (i.e., significant direct and indirect effects) or no mediation (i.e., only significant direct effects) is occurring.

A variety of fit indices including both absolute (χ^2 value; the goodness-of-fit index [GFI]) and incremental (the comparative fit index [CFI]) fit indices as well as the root mean square error of approximation (RMSEA) and standardized root-mean-square residual (SRMR) were used to assess model fit. This last index was selected because it is less sensitive to the violation of distributional assumptions (Hu & Bentler, 1999). A nonsignificant χ^2 value indicates that the specified model is not significantly different from the data and thus a good fit. An RMSEA value less than .08, an SRMR value less than .05, and values of .90 or greater for both the GFI and CFI suggest a good fit between the model and the data (Byrne, 1998).

Results

Examination of the PSSMS

Prior to running analyses, 10 cases were dropped owing to missing data on one or more variables, reducing the sample size to 508 participants. A principal axis factor analysis with oblique (oblimin) rotation was conducted to examine the factor structure of the Psychological Sense of School Membership Scale. The sums of squares loadings revealed three eigenvalues greater than 1. Items with factor loadings greater than .40 were included on each factor. Six items loaded on Factor 1, reflecting students' perceptions of teacher support. These items were similar to items comprising established measures of perceived teacher support in the academic domain (see Patrick & Ryan, 2005). Three items loaded on Factor 2, reflecting students' perceptions of alienation or feelings of not being accepted in class. Finally, five items loaded on Factor 3, representing students' perceptions of general relatedness in their physical education classes (see Table 1 for modified items, factor loadings, and variance explained). Specifically, items loading on Factor 3 captured feelings of being liked and included, which are consistent with established measures of perceived relatedness that have been modified for use in youth physical activity settings (see Hollembek & Amorose, 2005; Standage et al., 2006). Items 16 and 2 were dropped from further analyses because they cross-loaded on two factors and did not meet the .40 loading criteria, respectively. The items comprising Factors 1 and 3 were used to represent perceived teacher support and perceived relatedness, respectively, in the main analyses. The correlation

between these two factors was .58 and the rotated eigenvalues presented in Table 1 show that they explained the greatest amount of variance in the items. The items from Factor 2 (perceived alienation) were not used in the main analyses because they were not conceptually consistent with either perceived teacher support or relatedness. Support for the distinction of the second factor was also demonstrated in the low-to-moderate correlations of perceived alienation with perceived teacher support and relatedness, respectively ($r = .29$ and $.46$).

Table 1 Items and Factor Loadings from the Principal Axis Factor Analysis of the Modified Psychological Sense of School Membership Scale

Item number	Item	Factor 1 (Teacher support)	Factor 2 (Alienation)	Factor 3 (Relatedness)
7	My P.E. teacher is not interested in people like me	.73	.19	.21
4	My P.E. teacher respects me	.72	-.13	-.14
14	I can talk to my P.E. teacher if I have a problem	.62	-.17	-.16
12	My P.E. teacher is interested in me	.61	-.08	-.14
6	I wish I were in a different P.E. class	.52	.12	-.10
15	I am treated with as much respect as the other students in my P.E. class	.47	.13	-.21
10	I feel very different from most of the other students in my P.E. class	-.01	.66	.02
13	It is hard for people like me to be accepted in my P.E. class	.09	.54	-.12
3	Sometimes I feel like I don't belong in my P.E. class	.02	.45	-.29
9	Other students in my P.E. class like me the way I am	-.08	.11	-.68
1	I feel like I'm a part of my P.E. class	.15	.02	-.64
11	People in my P.E. class are friendly to me	-.04	.30	-.56
8	I can really be myself in my P.E. class	.25	-.09	-.53
16	I feel proud of belonging in my P.E. class	.44	-.03	-.46
5	I am included in lots of activities in my P.E. class	.23	.04	-.42
2	Other students in my P.E. class take my opinions seriously	.14	.05	-.27
Eigenvalues		5.45	1.19	0.51
% variance explained		34.07%	7.41%	3.16%
Rotated Eigenvalues		4.43	1.88	4.38

Note. Item 16 was dropped owing to high loadings on both Factors 1 and 3. Item 2 was dropped because it failed to meet the inclusion criterion ($>.40$) on all factors.

Scale Reliabilities and Descriptive Statistics

Descriptive statistics, bivariate correlations, and internal consistencies are shown in Table 2. All scales met the .70 criterion for internal consistency reliability (see Nunnally, 1978), with the exception of the performance climate ($\alpha = .48$) and perceived autonomy ($\alpha = .66$) measures. Performance climate was dropped from all subsequent analyses. Item 3 was dropped from the autonomy scale as a result of low correlations with the other autonomy items and conceptual similarity to some of the items used to assess motivation (“I participate in P.E. because I want to”), which resulted in an alpha coefficient of .69. Therefore, four items were used to assess perceptions of autonomy in the main analyses (two items were randomly selected to create each parcel). In addition, the internal consistency reliabilities of the four motivation subscales ranged from .72 to .90. Examination of variable means revealed that students felt supported by their teachers and that their teachers emphasized learning and improvement in class. Students also felt fairly competent participating in physical activities, felt socially related in class, and were more self-determined than non-self-determined in their motivation in physical education. They also felt that they lacked opportunities to choose the activities they wanted to participate in during class. Bivariate correlations showed mostly positive relationships among variables.

Measurement Model

Before testing the measurement or structural models that were used to test for mediation, the item parcels were screened to examine univariate and multivariate normality. Standardized scores for univariate skewness and kurtosis met the criterion of less than ± 2 for all item parcels (Schutz & Gessaroli, 1993). Standardized values for multivariate skewness and kurtosis were 16.77 ($p < .01$) and 9.84 ($p < .01$), respectively. Although significant, the use of maximum likelihood estimation has been shown to be a robust approach and provide accurate results when dealing with

Table 2 Descriptive Statistics, Correlations, and Cronbach's Alpha Coefficients^a ($N = 508$)

Variable ^b	Range	1	2	3	4	5	6
1. Mastery climate	1 to 5	.82					
2. Teacher support	1 to 5	.49**	.82				
3. Competence	1 to 4	-.04	.11*	.77			
4. Autonomy	1 to 5	.14**	.17**	.12**	.69		
5. Relatedness	1 to 5	.28**	.62**	.39**	.21**	.78	
6. Self-determined motivation	9 to -9	.31**	.58**	.32**	.22**	.59**	—
Mean		4.27	3.98	2.98	2.60	3.96	2.56
Standard deviation		0.83	0.91	0.68	0.93	0.85	2.55

^aAlpha coefficients are presented along the diagonal in bold.

^bAll variables are measures of perceptions.

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

this degree of nonnormality (Hu & Bentler, 1998). Examination of the measurement model revealed a good fit to the data: $df = 39$, $\chi^2 = 81.59$, $p < .01$; RMSEA = .05; CFI = .99; SRMR = .03; GFI = .97. All item parcels loaded significantly ($p < .01$) on their assigned latent construct, squared multiple correlations were moderate to high, and the uniquenesses or errors of the observed variables appeared reasonable (see Table 3).

Testing for Mediation

The baseline model was tested first. In this model and all subsequent models, the disturbance terms among perceptions of competence, autonomy, and relatedness were allowed to correlate based on theoretical contentions of self-determination theory (see also Hollembeak & Amorose, 2005; Reinboth et al., 2004). Results showed that perceived teacher support was a negative suppressor of the relationships between mastery climate and need satisfaction (see Tabachnick & Fidell, 2007, pp. 154–155). Specifically, the relationships of mastery climate to perceived competence and relatedness were negative ($p < .01$). These relationships contradict bivariate correlations (see Table 2) and when perceived teacher support was removed from the model, mastery climate demonstrated significant and positive relationships with perceptions of competence, autonomy, and relatedness. This suppression effect indicates that substantial variance may be shared between perceived teacher support and mastery climate that is irrelevant to the prediction of need satisfaction (Maassen & Bakker, 2001).

Two steps were taken to address the incidence of suppression. First, a measurement model was tested in which the item parcels for both mastery climate and teacher support were assigned to one latent construct. This model demonstrated a poor fit to the data ($df = 2$, $\chi^2 = 194.71$, $p < .01$; RMSEA = .43; CFI = .77; SRMR = .11; GFI = .84), supporting the distinction between mastery climate and teacher

Table 3 Measurement Model Statistics

Item parcel	Loading, λ	Squared multiple correlation, R^2	Uniquenesses, δ
Mastery climate A	.81	.66	.34
Mastery climate B	.85	.72	.28
Teacher support A	.85	.72	.28
Teacher support B	.82	.67	.33
Competence A	.82	.68	.32
Competence B	.75	.57	.43
Autonomy A	.74	.55	.45
Autonomy B	.76	.58	.42
Relatedness A	.83	.68	.32
Relatedness B	.82	.67	.33
Self-determined motivation A	.86	.74	.26
Self-determined motivation B	.88	.78	.22

Note. All variables are measures of perceptions. Loadings are from the completely standardized solution. All loadings are significant ($p < .01$).

support constructs. Thus, two separate models were examined to test for mediation: first with mastery climate and then with perceived teacher support serving as the social contextual variable in the model (see Smith, 1999, for a similar approach when testing a model of physical activity motivation).

The baseline model with mastery climate is presented in Figure 1 (top). This model provided a reasonable fit to the data ($df = 26, \chi^2 = 157.32, p < .01$; RMSEA = .10; CFI = .95; SRMR = .07; GFI = .94), and all relationships were positive and significant ($p < .01$), including the indirect relationship between mastery climate and self-determined motivation (standardized path = .40).⁴ Next, the baseline model was compared with the alternative model (see Figure 1; bottom). In this model, the addition of the direct path between mastery climate and self-determined motivation

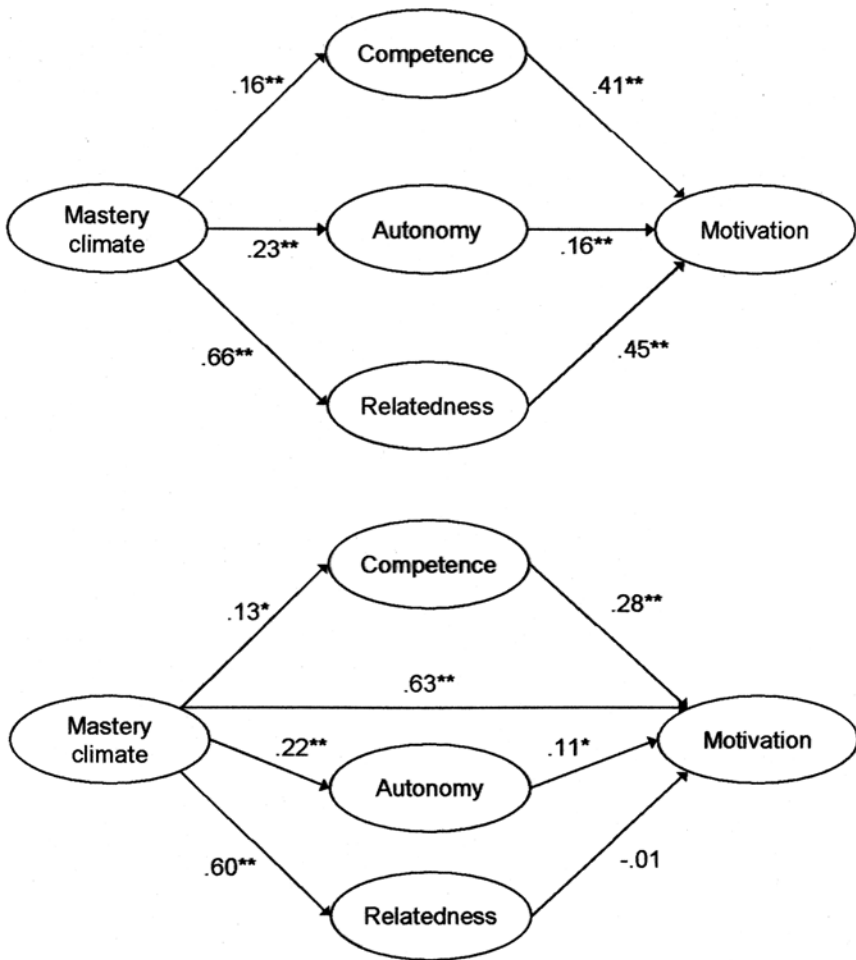


Figure 1 — Baseline and alternative models of the relationships among mastery climate, need satisfaction, and self-determined motivation. Path coefficients are from the completely standardized solution. All variables are measures of perceptions. * $p < .05$, ** $p < .01$.

freed 1 *df* and provided a significantly ($p < .01$) better fit to the data: $df = 25$, $\chi^2 = 63.17$, $p < .01$; RMSEA = .05; CFI = .98; SRMR = .03; GFI = .98. The direct relationship between mastery climate and self-determined motivation was significant, and the indirect relationship was nonsignificant, indicating that need satisfaction did not mediate this relationship. Of note was the nonsignificant relationship between perceived relatedness and self-determined motivation. This model explained 2%, 5%, and 36% of the variance in competence, autonomy, and relatedness perceptions, respectively, and 56% of the variance in self-determined motivation.

The baseline model with perceived teacher support is presented in Figure 2 (top). The baseline model provided a good fit to the data ($df = 26$, $\chi^2 = 46.01$, $p < .01$; RMSEA = .04; CFI = .99; SRMR = .03; GFI = .98) and all direct paths

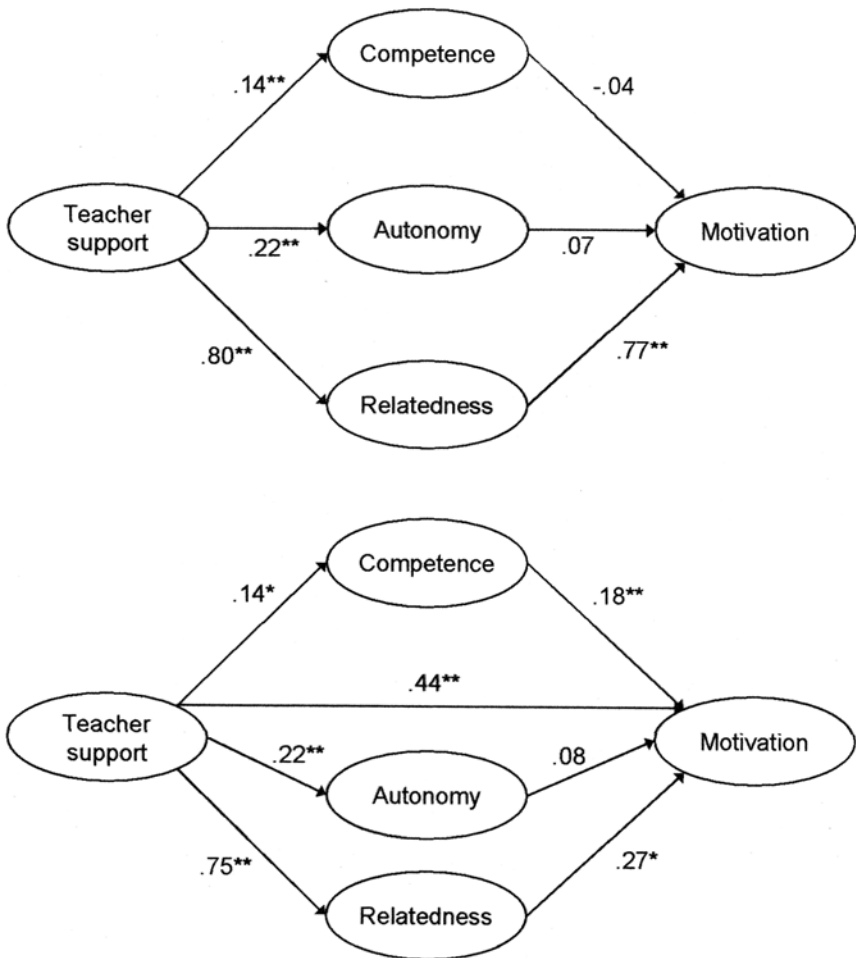


Figure 2 — Baseline and alternative models of the relationships among perceived teacher support, need satisfaction, and self-determined motivation. Path coefficients are from the completely standardized solution. All variables are measures of perceptions. * $p < .05$, ** $p < .01$.

were positive and significant ($p < .01$) except the paths between competence and autonomy perceptions and self-determined motivation. The indirect relationship between perceived teacher support and self-determined motivation was also significant (standardized path = .63). Next, the alternative model (see Figure 2; bottom) was tested and provided a significantly ($p < .01$) better fit to the data: $df = 25$, $\chi^2 = 27.04$, $p = .35$; RMSEA = .01; CFI = 1.00; SRMR = .02; GFI = .99. In this model, the significant ($p < .01$) positive direct and indirect (standardized loading = .25) relationships between perceived teacher support and self-determined motivation support partial mediation. Comparison of the indirect to total effects of perceived teacher support on self-determined motivation revealed that 36% of the total relationship was indirect in nature. In this model, a positive and significant relationship emerged between perceived competence and self-determined motivation. This alternative model explained 2%, 5%, and 57% of the variance in competence, autonomy, and relatedness perceptions, respectively, and 59% of the variance in self-determined motivation.

Discussion

The relationships among perceptions of the social context, need satisfaction, and motivation were examined in fifth- and sixth-grade physical education students. Although competence-related self-perceptions have been considered central to motivation in achievement settings (e.g., Harter, 1978; Nicholls, 1989), the results of this study demonstrate that feeling physically competent may not always be the primary source of children's self-determined motivation in physical education. The results regarding the roles of perceived teacher support, mastery climate, and relatedness in predicting self-determined motivation illustrated the significance of the social context and social relationships to motivational processes in the physical education setting and uncovered important directions for future research.

The first hypothesis was supported by the significant relationships of both mastery climate and teacher support to perceived competence, autonomy, and relatedness and self-determined motivation. Their positive relationships with need satisfaction support past research in both sport and physical education settings (Ferrer-Caja & Weiss, 2000; Gagne et al., 2003; Reinboth et al., 2004; Sarrazin et al., 2002; Standage et al., 2003). The strengths of the individual relationships suggest that these social contextual factors are more important for students' feelings of relatedness than their feelings of competence or autonomy. In addition, mastery climate and teacher support were the strongest predictors of self-determined motivation in their respective models. The motivational significance of mastery climate supports a plethora of past research in the physical education setting (e.g., Cury et al., 1996; Goudas & Biddle, 1994; Standage et al., 2003) and the role of perceived teacher support in predicting motivation aligns with research findings in the academic setting (Goodenow, 1993a; A.M. Ryan & Patrick, 2001; Wentzel, 1997). Contrary to some research in the sport setting (e.g., Hollebeak & Amorse, 2005), students' perceptions of teacher support appear to be instrumental in supporting self-determined motivation in physical education. The examination of perceived teacher support in relation to need satisfaction and self-determined motivation extends past research on the social context of physical education.

The findings provided limited support for the hypothesis regarding the mediating roles of perceived competence, autonomy, and relatedness and their relationships to self-determined motivation. Indeed, need satisfaction only partially mediated the relationship between perceived teacher support and self-determined motivation and did not mediate the relationship between mastery climate and self-determined motivation. These results are inconsistent with research in sport and physical education settings that have found perceived competence, autonomy, and relatedness to fully mediate the relationship between various social contextual factors and motivation (e.g., Hollebeak & Amorose, 2005; Standage et al., 2003, 2006). For example, the recent work of Hollebeak and Amorose and of Standage et al. (2006) in the sport and physical education settings, respectively, both found that a model of partial mediation did not fit the data better than a full mediation model. Collectively, they found that need satisfaction mediated the relationships of perceived democratic and autocratic coaching styles and autonomy support to self-determined motivation. In contrast, our results suggest that students' perceptions of a mastery climate and teacher support are related directly to their motivation in the physical education setting.

Contrary to predictions, the relationships between perceived relatedness and self-determined motivation in the mastery climate model and between perceived autonomy and self-determined motivation in the teacher support model were non-significant. The former relationship appears to have been suppressed by the direct relationship between mastery climate and self-determined motivation because it was significant in the full mediation model (see Figure 1; top). The second relationship is somewhat consistent with the weak relationship between perceived autonomy and self-determined motivation in the mastery climate model (see Figure 1; bottom). This weak relationship contradicts self-determination theory (R.M. Ryan & Deci, 2000), which asserts that feelings of autonomy should be central to feelings of self-determination. An explanation for this weak relationship may lie in the way perceived autonomy was operationalized in this study as perceived choice of activities in physical education. Utilizing a measure that captures the breadth of this construct may lead to a stronger association between perceived autonomy and self-determined motivation.

The relative importance of relatedness perceptions for predicting self-determined motivation in the teacher support model raises the question, yet again, of what determines the motivational salience of perceived competence, autonomy, and relatedness in a specific situation. Some studies have found competence perceptions to be the most important predictor of motivation in physical education (e.g., Ntoumanis, 2001; Standage et al., 2006), whereas other research has shown relatedness perceptions to be most important (Standage et al., 2003). Ntoumanis and Standage and colleagues have suggested that feeling competent may hold greater functional significance in physical education owing to the public demonstration and importance of physical ability within this context. However, Reeve (2002) contends that perceived relatedness is important for the development of self-determined motivation for tasks that are not intrinsically interesting. Physical education students may lack intrinsic interest if they generally have low feelings of competence or autonomy in class. In contrast to volunteer sport settings, physical education students demonstrate a greater range of physical competencies (Biddle, 2001) and often lack choice in terms of class attendance. To the extent that students are not inherently

attracted to activities in physical education, perceived relatedness may hold greater importance for the development of self-determined motivation. Research designs that allow for examining potential moderating variables and testing the invariance of the relationships between need satisfaction and motivation across different age groups and contexts may help address this theoretical issue.

A number of other future research directions emanate from the results of this study. First, the importance of relatedness perceptions to motivation in a growing number of studies in the physical domain (Hollebeak & Amorose, 2005; Standage et al., 2003) suggests the need to examine potential sources of relatedness perceptions in physical activity settings, such as peers and specific teacher practices. A second consideration for future research emanates from the poor internal consistency reliability of the performance climate scale in this study. This finding was inconsistent with research evidence showing that these items provide a valid and reliable assessment of this construct in samples of British (Standage et al., 2003) and French (Biddle et al., 1995) physical education students. Future investigations are needed to uncover potential reasons why this measure performed poorly in this sample, such as lack of developmental or cultural validity.

Third, the suppression of the relationships between mastery climate perceptions and need satisfaction by perceived teacher support suggests there may be a more complex relationship between these two aspects of the social context. Noddings (2005) has suggested that mastery climate perceptions may contribute to students' beliefs that their teachers support or care about them. Specifically, she states that supportive teachers encourage students to do their best within the limits of their individual ability. Similarly, qualitative research has revealed that students judge teachers to be supportive when they develop individual expectations for students, use a democratic interaction style, and provide constructive feedback (Wentzel, 1997). This conceptualization of the relationship between mastery climate perceptions and perceived teacher support requires empirical testing.

Finally, further examination of the validity of the items from the PSSMS (Goodenow, 1993b) to assess perceived relatedness and teacher support is needed. Allen (2006) has examined the psychometric properties of this measure in the sport context with adults to determine which items best capture general feelings of relatedness. Most recently, Allen (2006) tested the factorial validity of the scale through a series of confirmatory factor analyses. In her investigation, the negatively worded items and the items relating specifically to the coach were dropped from the final model, reflecting feelings of relatedness. Allen's results are consistent with the current findings in which teacher-specific items and negatively worded items factored separately from items reflecting general feelings of relatedness. Future research is needed to continue to examine the validity of the modified PSSMS items for use in the physical education setting to assess both perceived teacher support and relatedness.

The motivation to engage in physical activities in fifth- and sixth-grade physical education students appears closely tied to how much they believe their teachers emphasize individual standards for success and provide emotional support. In addition to these direct relationships, perceived teacher support also appears to relate to motivation through students' feelings of competence and relatedness. Therefore, creating a classroom setting in which students are rewarded for task mastery and personal improvement and feel their teachers care about and value them

as individuals is critical for encouraging the development of perceived competence, autonomy, and relatedness and self-determined motivation in physical education.

Notes

1. These participants are part of a larger longitudinal study examining the transition from elementary school into and through middle school.
2. The number of participants who marked the Other and American Indian categories may reflect what the researcher observed as children's decision to identify being an American with being a Native American and to indicate their specific national heritage (e.g., German) as "Other."
3. Two items—"People here notice when I'm good at something" and "People here know I can do good work"—were removed because they were deemed to overlap conceptually with a social recognition goal orientation.
4. The largest modification index in the baseline model for mastery climate indicated a direct path from mastery climate to self-determined motivation. This provides additional support for examining the alternative model.

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