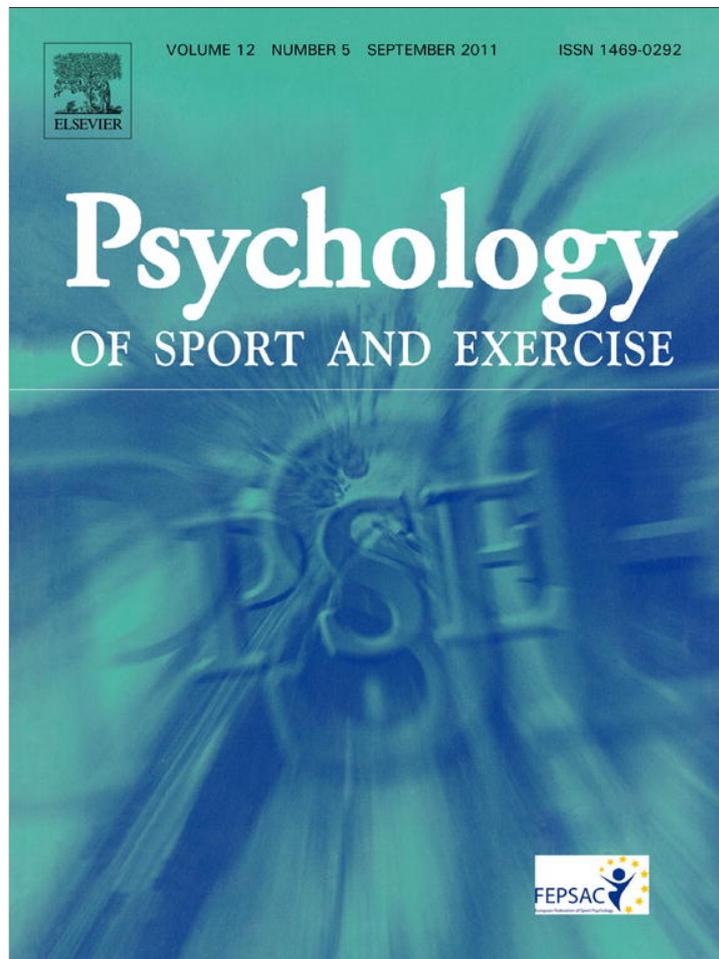


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Social physique anxiety in physical education: Social contextual factors and links to motivation and behavior

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ABSTRACT

Objectives: The purposes of this study were to examine the associations of social relationships with teachers and peers (i.e., peer acceptance, presence of a best friend and close friends, teacher support) to SPA in physical education and to test the mediating role of motivation regulations in the relationship between social physique anxiety (SPA; Hart, Leary, & Rejeski, 1989) and behavior (i.e., effort, participation avoidance).

Design: Cross-sectional survey.

Method: High school physical education students ($N = 146$; $M_{\text{age}} = 15.9$ years) completed an online survey in their school's computer lab assessing study variables.

Results: Results of a hierarchical multiple regression analysis revealed that perceived peer acceptance was a negative predictor ($p < .01$) of SPA. In addition, path analysis did not support the mediating role of individual motivation regulations in the relationship between SPA and behavior. Results of the path analysis showed SPA as a negative predictor of autonomous motivation and a positive predictor of external regulation, amotivation and participation avoidance. Finally, students with greater autonomous motivation and introjected regulation and lower amotivation reported more effort in class and greater amotivation predicted a higher likelihood of avoiding participation in class.

Conclusions: General feelings of acceptance and belonging among one's peers may help buffer against feelings of SPA in physical education. In addition, SPA demonstrates different relationships with individual motivation regulations and behavior in this setting. However, the lack of support for the mediating roles of individual motivation regulations suggests a more complex relationship among SPA, motivation and behavior and requires further testing.

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Introduction

Physical changes associated with puberty and an increased importance of peer evaluations and acceptance leading up to and during adolescence can heighten students' sense of social awareness and self-consciousness (Brustad & Partridge, 2002; Harter, 1999). In no area is this more evident than with regard to adolescents' concerns about presenting their body or physique in a way that is socially desirable. Unfortunately, the more adolescents internalize the culturally prescribed physical ideal and the further they perceive themselves to be from the ideal, the more dissatisfied they are with the appearance of their body (Levine & Smolak,

2002). Body dissatisfaction increases significantly during the early adolescent years, especially for females who are often experiencing pubertal changes that take them further from this cultural ideal (Levine & Smolak, 2002). Higher levels of body dissatisfaction and social self-consciousness can set the stage for the unpleasant feelings of social physique anxiety in some adolescents (Hart, Leary, & Rejeski, 1989).

Social physique anxiety refers to feelings of distress or apprehension about others potentially evaluating one's physical appearance in a negative manner (SPA; Hart et al., 1989). Adolescents who experience SPA are at a higher risk for a range of maladaptive behaviors that are used to cope with the uncomfortable feelings brought about by SPA (Hart et al., 1989; Kowalski, Mack, Crocker, Niefer, & Fleming, 2006; Sabiston, Sedgwick, Crocker, Kowalski, & Mack, 2007). SPA is of particular concern with respect to physical health outcomes since individuals with greater SPA tend to avoid physical activity settings (e.g., sports, exercise)

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where their body is likely to be on display or where their physical attributes are emphasized (Carron & Prapavessis, 1997; Hart et al., 1989). In a qualitative investigation of female adolescents, Sabiston et al. found that students coped with SPA by avoiding muscle-building activities, bringing in a note to avoid participating in physical education, smoking, and engaging in dangerous dieting practices. In addition, thoughts and feelings about one's body have the biggest impact on self-esteem during adolescence (Harter, 1999) making SPA a concern for both mental and physical health outcomes. Therefore, identifying factors that help us understand when individuals are most likely to experience SPA is important for minimizing the discomfort associated with SPA and the negative coping strategies that students may choose to pursue.

The importance of appearing physically attractive in front of one's peers during adolescence coupled with a focus on physical performance make high school physical education a likely place to observe individuals who may be suffering with this type of social anxiety. High school physical education is often compulsory, emphasizes public displays of ability and provides ample opportunity to judge the appearance of one's body. These factors may make physical education a setting where students experience a heightened perception that others are evaluating their body negatively. The likelihood of students experiencing SPA in the physical education setting prompted Koca and Asci (2006) to examine the effects of gender composition in physical education classes on social physique anxiety. Their results revealed a stronger preference for same-sex physical education classes in female Turkish high school students with greater social physique anxiety. Though little research exists in the physical education setting specifically, relevant research with adolescents and adult exercisers suggests that social physique anxiety may play an important role in shaping students' motivation and behaviors in class (e.g., Gillison, Standage, & Skevington, 2006; Thøgersen-Ntoumani & Ntoumanis, 2006). In addition, physical education motivation research indicates this may be a context where social agents (e.g., teachers, peers) have the potential to create a supportive learning environment (Cox, Duncheon, & McDavid, 2009; Cox & Williams, 2008; Hagger et al., 2009; Standage, Duda, & Ntoumanis, 2006) that could help reduce SPA.

Though the role of significant others in exacerbating or protecting against feelings of SPA has not been examined in the physical education setting, general SPA research with adolescents and adults provides some insight into how social relationships may be linked with SPA. For instance, research with adolescents and young adults has illustrated how levels of SPA differ depending on the presence of different significant others (Brunet & Sabiston, 2011; Carron & Prapavessis, 1997; Sabiston et al., 2007). Brunet and Sabiston (2011) used a contextualized measure of SPA to demonstrate that SPA in the presence of peers was greater than SPA in the presence of parents for young adults. Similarly, Carron and Prapavessis (1997) showed that undergraduate students experienced less SPA when in the presence of a best friend or a group of friends. Finally, Sabiston et al. (2007) showed that adolescent girls felt comfortable and did not worry about their appearance when they were with their close friends as opposed to a general peer group. These studies provide preliminary support for important aspects of the social context to consider in future research on SPA.

Relevant dimensions of the social context in physical education include teacher and peer relationships. In addition to the presence of significant others, the quality of students' relationships with their teacher and peers in the physical education setting may help explain why SPA tends to be lower in the presence of certain social agents. Supporting this prediction, Sabiston et al. (2007) found that seeking social support from others (e.g., parents, friends) was a coping strategy that adolescent girls used to manage negative

feelings associated with SPA. In addition, adolescent athletes who experience greater peer acceptance (i.e., feelings of popularity and liking among peers) and have higher quality relationships with their parents are less likely to have disturbed eating attitudes (Scoffier, Maiano, & d'Arrive-Longueville, 2010). Though this latter study did not examine SPA, disturbed eating attitudes are closely linked with body-related concerns (Lox, Martin Ginis, & Petruzzello, 2010). Therefore, supportive relationships with one's physical education teacher and peers may help buffer against feelings of SPA that are likely to be salient in a context that places a strong emphasis on physical appearance and abilities. Physical education research shows that greater feelings of peer acceptance and perceived emotional support from one's physical education teacher relate to more positive classroom experiences including lower performance anxiety and more autonomous motivation (Cox et al., 2009; Cox & Williams, 2008). However, the role of social relationships in predicting SPA in physical education has not been examined and represents a viable gap to fill in the literature.

In addition to the absence of knowledge about the roles of teachers and peers, very little is known about how SPA affects students' behaviors in physical education. Recent research shows that the reasons behind individuals' physical activity choices may mediate the relationship between SPA and behavior (Brunet & Sabiston, 2009; Gillison et al., 2006). Self-determination theory (Ryan & Deci, 2007) conceptualizes these different reasons as distinct motivation regulations that vary in their degree of self-determination along a continuum from completely autonomous or self-determined to completely controlling or non-self-determined. The continuum is comprised of intrinsic motivation, four types of extrinsic motivation and amotivation. Intrinsic motivation (e.g., participating because it is fun) is the most self-determined form of motivation and is satisfied through engagement in the activity itself. The following four extrinsic motivation regulations appear next on the continuum in order from most to least autonomous: integrated regulation (e.g., participating because it is part of one's life goals), identified regulation (e.g., participating because it is valued or important), introjected regulation (e.g., participating in order to feel pride or avoid feeling shame) and external regulation (e.g., participating to lose weight). Finally, amotivation represents a lack of motivation or intention and can be self-determined or not.

More autonomous or self-determined forms of motivation in physical education should associate with greater levels of physical activity. This has been supported in the physical education setting with behavioral indices such as self-reported effort (e.g., Cox et al., 2009; Taylor, Ntoumanis, Standage, & Spray, 2010), number of steps taken during class (Lonsdale, Sabiston, Raedeke, Ha, & Sum, 2009) and leisure-time physical activity behavior (Cox, Smith, & Williams, 2008; Hagger & Chatzisarantis, 2007; Hagger et al., 2009). Linking social physique anxiety to motivation, Brunet and Sabiston (2009) suggest that those who experience more concern about others negatively evaluating their body may internalize a sense of pressure to be physically active in order to improve their outward appearance. This internalized pressure would represent a more controlling form of motivation and explain why those with higher social physique anxiety may be less likely to actually engage in physical activities. Two key studies now support this contention. In one of the few studies to examine these constructs in adolescents, SPA was linked with having more extrinsic goals for exercise which, in turn, related to less autonomous motivation (i.e., represented by an index of relative autonomy) and less subsequent exercise behavior (Gillison et al., 2006). Similarly, Brunet and Sabiston (2009) found that more autonomous motivation (i.e., represented by an index of relative autonomy) served as a mediator in the relationship between SPA and leisure-time physical activity in young adults (17–23 years). Specifically, greater feelings of SPA

predicted less autonomous motivation which linked to lower levels of physical activity behavior.

To date, no research has been conducted to test the unique roles of individual motivation regulations in the relationship between SPA and behavioral indices of motivation (e.g., effort, participation avoidance). Though research (e.g., Thogersen-Ntoumani & Ntoumanis, 2006) shows that individuals with higher SPA experience higher controlling forms of motivation (i.e., introjected regulation, external regulation) and amotivation and lower autonomous motivation (i.e., intrinsic motivation and identified regulation), there has been no research to simultaneously examine the indirect relationship between SPA and relevant behavioral outcomes in physical education. Since motivation regulations have been shown to have unique relationships with different behavioral outcomes (e.g., autonomous motivation relates most strongly and consistently to behavioral indices; Ntoumanis, 2001; Standage, Duda, & Ntoumanis, 2003), the relationship of SPA to behavior may depend on how strongly SPA relates to each individual motivation regulation. Examining these regulations individually will offer additional information about the motivational links between SPA and behavior.

This study addresses theoretically and empirically supported gaps in the literature by fulfilling two study purposes. The first purpose was to examine both the presence and quality of relationships with teachers and peers in physical education class as predictors of SPA in physical education. More positive social relationships with teachers and peers (i.e., higher perceived teacher support and peer acceptance) and the presence of friends in class (i.e., presence of a best friend and number of close friends present) were expected to relate negatively to SPA. The second purpose was to extend the work of Brunet and Sabiston (2009) by testing the mediating role of individual motivation regulations in the relationship between SPA in physical education and behavior. Based on the existing research utilizing an index of relative autonomy, it was hypothesized that greater feelings of SPA in physical education would relate positively to more controlling forms of motivation (i.e., introjected and external regulation) and amotivation and negatively to more autonomous forms of motivation (i.e., intrinsic motivation and identified regulation). In turn, based on SDT, more autonomous motivation regulations and less controlling motivation regulations (and amotivation) were expected to associate with greater physical activity behavior (i.e., effort in class) and less avoidance behavior (i.e., attempts to get out of participating in class). Consistent with Brunet and Sabiston's work using a relative autonomy index, motivation regulations were hypothesized to mediate the relationship between SPA and behavior.

Methods

Participants and procedure

First, permission was sought and secured from school administrators and the institutional review board to conduct this study on students' physical education experiences. Next, students ($N = 146$; $M_{age} = 15.9$, $SD = 1.3$) from a high school in the Midwest region of the United States were invited to participate. The sample included 57 males ($M_{age} = 15.89$) and 88 females ($M_{age} = 15.83$; 1 did not report gender). Only those students who agreed to participate and returned a signed parent consent form completed a multi-section online questionnaire containing measures of all study variables during a regularly scheduled physical education class. Teachers were not permitted to be present when students completed the questionnaire in a school computer lab. Before beginning the survey, students were told that their participation is voluntary, they can discontinue participation at any time and that their responses are anonymous as they were not asked for their names on the survey.

Participants were mostly female (61%) and Caucasian (96%) and distributed equally across grades 9 ($n = 42$), 10 ($n = 31$), 11 ($n = 37$) and 12 ($n = 35$; 1 participant did not respond). In addition to these demographic variables, students reported their height (in inches) and weight (in pounds) so that their body mass index (BMI) could be calculated (weight in kilograms divided by height in meters squared) as a rough measure of weight status. BMI has been identified as an important contributor to SPA in past research and was used as a control variable in the main analyses (e.g., Mack, Strong, Kowalski, & Crocker, 2007).

Measures

Social physique anxiety

The nine-item version of the Social Physique Anxiety Scale (Hart et al., 1989; Martin, Rejeski, Leary, McAuley, & Bane, 1997) was used to assess situation-specific anxiety related to social evaluation of one's body during physical education class. Students responded to items on a scale from *not at all characteristic of me* (1) to *extremely characteristic of me* (5). Items were modified to refer to how students feel in physical education specifically (e.g., "It would make me uncomfortable to know others in my PE class were evaluating my physique/figure"). Many recent studies have demonstrated support for the validity and reliability of these scale scores with samples of adolescents (e.g., Mack et al., 2007). Additionally, there is support for the validity and reliability of scale scores when using contextualized versions of this measure (Brunet & Sabiston, 2011; Kruijselbrink, Dodge, Swanburg, & MacLeod, 2004).

Perceived teacher support

A four-item measure of perceived emotional support that has been modified by Patrick and Ryan (2005; Ryan & Patrick, 2001) and used in academic settings assessed students' perceptions that their teacher cares about and understands them as individuals. "PE" was added to each item 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). Scale scores have received support for construct validity and reliability in the physical education setting (Cox et al., 2009).

Perceived peer acceptance

The social acceptance subscale ($n = 6$) from Harter's (1988) Self-perception Profile for Adolescents was modified to assess students' feelings of popularity or acceptance by their peers in PE (e.g., "Some teenagers find it hard to make friends in PE, BUT other teenagers find it's pretty easy to make friends in PE"). In these items, students first decided which of two items described them best and then if that item was *really true* or just *sort of true* for them. The original and modified (i.e., for the physical education setting) versions of this scale have demonstrated adequate construct validity and scale reliability in samples of adolescents (Cox et al., 2009; Harter, 1988).

Presence of friends

Two items asked students if their best friend was in their current physical education class ("yes" or "no") and how many of their close friends were in class with them. The latter question had six response options (i.e., 0, 1, 2, 3, 4, 5 or more).

Motivation regulations

Motivation regulations (intrinsic motivation, identified, introjected and external regulation, amotivation; 4 items for each type of motivation) were assessed with the Perceived Locus of Causality Scale (Goudas, Biddle, & Fox, 1994). The scale begins with the stem, "I take part in PE class..." followed by different reasons for participation that reflect the different types of motivation. Students responded to items

Table 1
Means, standard deviations, bivariate correlations and internal consistency reliabilities for study variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. SPA	.91													
2. BMI	.35**	–												
3. Teach. support	–.04	–.03	.89											
4. Peer acceptance	–.46**	–.13	.19*	.69										
5. Best friend	–.07	.00	.08	.24**	–									
6. Close friends	–.19*	.00	.30**	.40**	.35**	–								
7. Intrinsic motivation	–.26**	–.16*	.45**	.42**	.23**	.33**	.85							
8. Identified reg.	–.15	–.14	.43**	.30**	.15	.23**	.84**	.87						
9. Autonomous mot.	–.21*	.16	.46**	.38**	.20*	.29**	.96**	.96**	.92					
10. Introjected reg.	.12	–.09	.33**	.02	.05	.08	.58**	.67**	.65**	.69				
11. External reg.	.24**	.05	–.08	–.25**	–.11	–.10	–.14	–.08	–.11	.34**	.82			
12. Amotivation	.26**	.08	–.29**	–.30**	–.11	–.19*	–.55**	–.51**	–.55**	–.18*	.50**	.84		
13. Effort	–.18*	–.11	.45**	.27**	.01	.13	.59**	.61**	.62**	.50**	–.05	–.52**	.89	
14. Part. avoidance	.26*	.12	–.26**	–.07	.08	–.16	–.23**	–.14	–.19*	–.08	.31**	–.25**	–	
Range	1–5	–	1–5	1–4	0–1	0–5	1–7	1–7	1–7	1–7	1–7	1–7	1–7	0–5
N	146	140	146	146	146	146	146	146	146	146	146	146	146	145
Mean	2.40	22.62	3.56	2.83	–	3.24	4.01	3.47	3.74	3.45	3.97	3.44	3.54	0.48
Standard deviation	0.97	4.81	1.06	0.62	–	1.58	1.42	1.47	1.39	1.32	1.53	1.57	1.45	1.05

Notes: SPA = social physique anxiety. BMI = body mass index. Part. avoidance = how many times student brought in a note to get out of participating in physical education. 56% of students reported that their best friend was in their PE class. Cronbach's alpha coefficients are along the diagonal in bold. **p* < .05. ***p* < .01.

on a 7-point scale ranging from *strongly disagree* (1) to *strongly agree* (7). Physical education research has supported the reliability and validity of these motivation subscale scores (e.g., Standage et al., 2006).

Self-reported effort

The amount of effort students put into 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) modified for 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). Recent physical education research has supported the validity and reliability of these 3 items for assessing self-reported effort (Ullrich-French & Cox, 2009).

Participation avoidance

One item created for this study assessed participation avoidance. Students were asked how many times they had brought in a note from a parent or doctor to get out of participating in physical education when they were actually able to participate. Response options ranged from “0” to “5 or more”.

Data analysis

First, 4 cases were deleted (*n* = 146) due to BMI scores either above the 99th percentile or below the 1st percentile as these could indicate falsified information. Preliminary analyses included calculating descriptive statistics and scale reliabilities for all study variables. To address the first study purpose, a hierarchical multiple regression analysis was conducted using PASW Statistics 18 (IBM Corporation) with body mass index (BMI), gender and grade entered on the first step and perceived teacher support, peer acceptance, presence of best friend and number of close friends in class entered on the second step as the independent variables. SPA in physical education class served as the dependent variable.

In order to address the second study purpose, two models were tested and compared using path analysis (i.e., observed variables only) in Lisrel 8.71 (Scientific Software International Inc., Chicago, IL) to examine the relationships among SPA, individual motivation regulations and behavioral indices (i.e., effort, avoidance). Path analysis was used in order to maintain a reasonable ratio (i.e., 10:1

of parameter estimates to sample size (Kline, 2005). A model of full mediation was tested as a baseline model and then compared to an alternative model that included both direct and indirect relationships between SPA and behavior in accordance with the recommendations of James, Mulaik, and Brett (2006). The mediation model was rejected if a) the direct paths in the alternative model were significant and b) the alternative model offered a superior fit to the data. The following fit indices were examined to assess the overall fit of the two models (see Byrne, 1998; Hu & Bentler, 1999): root mean square error of approximation (RMSEA; values ≤ .08), comparative fit index (CFI: values ≥ .95) and the standardized root mean squared residual (SRMR: cut-off values close to .08). Chi-square (χ^2) values were examined to test for a significant difference in the fit of the two models. In addition, CFI values (see Cheung & Rensvold, 2002) and Akaike's Information Criterion (AIC) were compared to see if there was a meaningful difference between the two models (e.g., $\Delta CFI \leq .01$). Gender and age invariance among these relationships were not tested due to the relatively small sample size and evidence with adolescents and young adults that the relationships among SPA, motivation and behavior are invariant across gender (Brunet & Sabiston, 2009; Gillison et al., 2006). These same studies have demonstrated similar magnitudes of relationships across age group (i.e., younger vs. older adolescents and young adults), though this has not been formally tested and should be addressed in future research.

Results

See Table 1 for means, standard deviations, scale reliabilities and bivariate correlations. Intrinsic motivation and identified regulation were strongly correlated (*r* = .84) and thus combined to represent “autonomous” motivation in all analyses (see Standage et al., 2003).¹ All variables met or exceeded the standard cut-off

¹ We also tested models that included both intrinsic motivation and identified regulation individually in the path analysis. When both were included, neither variable related to effort in the physical education setting. Since this is contrary to the bivariate correlations, likely, the high correlation between intrinsic motivation and identified regulation resulted in suppression of the relationships between these regulations and effort. The high correlation between these two types of motivation poses problems in empirically distinguishing these constructs.

criteria for internal consistency reliability ($\alpha \geq .70$) with the exception of peer acceptance and introjected regulation ($\alpha = .69$). Students reported moderately low levels of SPA, moderate levels of all motivation regulations and amotivation, moderately high levels of teacher support, perceived peer acceptance and effort and an average of just over three close friends in class with them. Fifty-six percent of students reported that their best friend was in class with them and the average number of times students reported bringing in a note to get out of participating in class was less than one.

Tests of univariate normality showed that participation avoidance (positively skewed and positively kurtotic) and SPA in physical education (positively skewed) were not normally distributed ($p < .001$). However, variance is typically not underestimated in cases of positive kurtosis when samples are greater than 100 (see Tabachnick & Fidell, 2007) and the significance of a skewness value is not as important as its absolute value which was relatively low for these two variables (2.49 and 0.81). Therefore, both variables were retained in their original form. A test of multivariate normality among the social relationship variables was not significant ($p > .001$), however multivariate skewness (z -score = 11.80) and kurtosis (z -score = 4.70) values were significant ($p < .001$) for the variables in the mediation analysis. These values are low and acceptable when using maximum likelihood estimation procedures (see Hu & Bentler, 1998; Ntoumanis, 2001; Standage, Duda, & Ntoumanis, 2005).

Testing the role of social relationship variables

The results of the hierarchical regression analysis were significant on both steps of the analysis indicating that BMI, gender and grade were significant predictors of SPA collectively ($F_{3, 136} = 11.41$; $p < .01$, $R^2 = .20$) and social relationship variables explained significantly more variance ($F_{7, 132} = 9.95$; $p < .01$, $\Delta R^2 = .14$). Specifically, students with a higher BMI, female students and students who felt less accepted by their peers reported significantly greater SPA in physical education. The grade students were in, perceived teacher support and the presence of friends did not predict levels of SPA.² The R^2 value revealed that predictor variables explained about 35% of the variance in SPA collectively. Based on recommendations from Cohen (1988), the role of social relationship variables (i.e., $\Delta R^2 = .14$) represents a medium effect size (where 1%, 9% and 25% variance explained represent small, medium and large effect sizes, respectively). Table 2 displays the results of this analysis.

Testing the mediating role of motivation regulations

Before testing the mediating role of motivation regulations in the SPA-behavior relationship, one case was deleted due to missing data ($n = 145$). In each path analysis, the mean of the items comprising each scale served as the observed variables. Consistent with other self-determination theory research (e.g., Ntoumanis, 2001; Standage et al., 2003) and due to the expected correlations among motivation regulations (Ryan & Deci, 2007), the errors among the different motivation regulations were allowed to correlate.

First, the full mediation model was tested and though the RMSEA was high, the other indices reflected a good fit to the data ($df = 4$, $\chi^2 = 8.89$, $p > .05$; RMSEA = .10; CFI = .99; SRMR = .04). In addition, the hypothesized model AIC (57.22) was lower than the

² We also tested for potential interactions among social relationship variables, gender and grade in predicting SPA using multiple regression analysis and no significant relationships emerged. This indicates that these relationships do not differ between males and females or between different grades though a larger sample size may be able to detect smaller effect sizes.

Table 2

Results of the hierarchical multiple regression analysis with social relationship variables predicting social physique anxiety.

Predictor variable	B	SE	β	R^2	ΔR^2
Step 1					
BMI	.08	.02	.38**	.20**	
Gender	.52	.15	.26**		
Grade	-.12	.07	-.15		
Step 2					
BMI	.07	.02	.33**	.35**	.14**
Gender	.36	.15	.18*		
Grade	-.11	.06	-.13		
Best friend	.10	.15	.05		
Close friends	-.03	.05	-.04		
Teacher support	.06	.07	.06		
Peer acceptance	-.62	.13	-.39**		

Notes: BMI = body mass index. B = Unstandardized regression coefficient. β = Standardized regression coefficient. SE = Standard error. R^2 = Amount of variance explained. * $p < .05$. ** $p < .01$.

independence AIC (381.17), but a bit higher than the saturated model AIC (56.00). In this model, SPA related negatively ($p < .05$) to autonomous motivation and positively ($p < .01$) to external regulation and amotivation. Further, autonomous motivation and introjected regulation were positive predictors ($p < .05$), whereas amotivation was a negative predictor ($p < .01$) of effort in class. Finally, higher amotivation predicted greater avoidance of participation ($p < .05$) in physical education. However, the indirect relationships between SPA and both behaviors were not significant. Next, the alternative model with both indirect and direct paths between SPA and behavior was tested. The alternative model showed a significantly and meaningfully better fit to the data ($df = 2$, $\chi^2 = .94$, $p > .05$; RMSEA = .00; CFI = 1.00; SRMR = .01; $\Delta\chi^2 = 7.95$, $p < .05$; $\Delta CFI = .01$). This time the hypothesized model AIC (52.94) was lower than both the independence and saturated model AICs (381.17 and 56.00, respectively). The significant paths were consistent with the first model and the added direct path between SPA and participation avoidance was significant. No indirect relationships were significant. Therefore, there was no support for mediation, indicating that motivation regulations did not explain the relationship between SPA and behavior in the physical education setting. This final model is shown in Fig. 1 with standardized path coefficients and the amount of variance explained in each of the dependent variables. The R^2 values indicate small effect sizes in predicting motivation regulations ($R^2 = .02-.07$) and medium to large effect sizes in explaining behavioral outcomes ($R^2 = .15-.49$).

To explore the lack of support for the mediational model, we decided to replicate the work of Brunet and Sabiston (2009) by testing an index of relative autonomy (i.e., $[-3] \times$ amotivation +

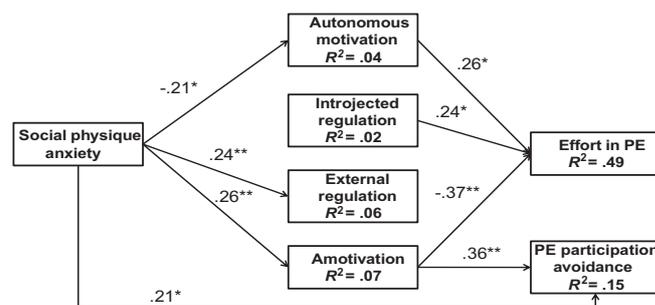


Fig. 1. Standardized path coefficients and amount of variance explained in the final model. R^2 = amount of variance explained. * $p < .05$. ** $p < .01$.

$[-2] \times$ external regulation + $[-1] \times$ introjected regulation + $[2] \times$ identified regulation + $[3] \times$ intrinsic motivation) as the mediator between SPA and behavior instead of the individual motivation regulations. Interestingly, when using the relative autonomy index (RAI), motivation did partially mediate the relationship between SPA and behavior ($df = 1, \chi^2 = 2.70, p > .05$; RMSEA = .11; CFI = .98; SRMR = .03). Specifically, SPA had an indirect relationship to effort through the RAI (indirect standardized coefficient = $-.18, p < .01$) and both direct and indirect relationships to participation avoidance (indirect standardized coefficient = $.06, p < .05$). SPA was a negative predictor of RAI and related positively to participation avoidance. RAI related positively to effort and negatively to participation avoidance, see Fig. 2.

Discussion

This study was the first to examine both the role of significant others in predicting SPA in the physical education setting and to test individual motivation regulations as mediators in the relationship between SPA and behavioral outcomes (i.e., effort and participation avoidance). The first hypothesis was only partially supported by the significance of perceived peer acceptance predicting SPA in physical education. Contrary to predictions, perceived teacher support and the presence of a best friend or number of close friends in class did not predict SPA in the main analyses. Our second set of hypotheses was also only partially supported by the negative relationship of SPA to autonomous motivation and the positive relationships of SPA to external regulation and amotivation. SPA did not relate to introjected regulation. Also consistent with predictions, autonomous motivation related positively whereas amotivation related negatively to self-reported effort in class. However, only amotivation related positively to the avoidance of class participation and introjected regulation related positively to effort, an unanticipated finding. Finally, it does not appear that motivation regulations individually mediate the relationship of SPA to behavioral indices in physical education. Rather, SPA related directly to participation avoidance, and did not relate to effort in class. In contrast, the RAI was found to partially mediate this relationship. These results will be discussed within the context of relevant research and theory.

This study was the first to explore elements of the physical education context identified in past research as potential correlates to SPA. Of the social relationship variables examined, the paramount role of peer acceptance supports the findings of Sabiston et al. (2007) who identified supportive peer relationships as a way of buffering against SPA. The relative importance of peer acceptance among all of the social relationship variables is consistent with physical activity research demonstrating that perceptions of general popularity serve a primary role among peer variables for a wide variety of motivation-related experiences (Cox

et al., 2009; Smith, Ullrich-French, Walker, & Hurley, 2006; Ullrich-French & Smith, 2006). Such research has also identified perceptions of friendship quality and conflict as contributors to motivation-related experiences. The nonsignificant findings regarding having a best friend or close friends in class may be explained by the conceptualization of friendship as the presence of friends rather than the quality of a particular friendship. Different features of friendship (e.g., support, conflict, jealousy) have both benefits and costs (e.g., Bowker & Rubin, 2009; Vitaro, Boivin, & Bukowski, 2009) and therefore should be tested for relevance to SPA in future research.

The results are contrary to research with undergraduate students that found the simple presence of a best friend and group of friends decreased SPA (Carron & Prapavessis, 1997). The peak importance of peer evaluations to self-esteem (Harter, 1999) during adolescence and the defined nature of the peer group in the physical education setting may explain why general peer acceptance is more salient than the presence of friends in this context. Additionally, the increased ability to develop intimate and supportive close friendships with development (Selman, 1990) may make friendships a more important source of support in later adolescence and early adulthood. The current findings contrast research conducted in the middle school physical education setting showing the significant role of teacher support in a variety of motivational experiences (Cox et al., 2009; Cox & Williams, 2008) and suggest potential developmental trends in salience of different sources of social support that need to be explored.

The findings of this study also extended past research by examining SPA, individual motivation regulations and behavior simultaneously. The relationships between SPA and motivation regulations are largely consistent with past research with exercisers and adolescents with SPA relating negatively to more autonomous motivation and positively to more controlling forms of motivation (Brunet & Sabiston, 2009; Gillison et al., 2006; Thogersen-Ntoumani & Ntoumanis, 2006, 2007). One exception was that SPA did not predict introjected regulation. This type of motivation is driven by internal contingencies of guilt, anxiety, and shame which seem to resemble the experience of SPA and in fact have been associated with SPA in adult exercisers (Thogersen-Ntoumani & Ntoumanis, 2006). Also, consistent with past research (Brunet & Sabiston, 2009; Gillison et al., 2006), the RAI mediated (though only partially) the relationship between SPA and effort. However, individual motivation regulations did not mediate the relationship between SPA and behavior. In both cases, SPA explained only a small amount of the variance in motivation. Perhaps, the relative degree of autonomy that students experience is more adequate for explaining how SPA might impact their behavior in class compared to individual motivation regulations. Though, as highlighted in past research (Ullrich-French & Cox,

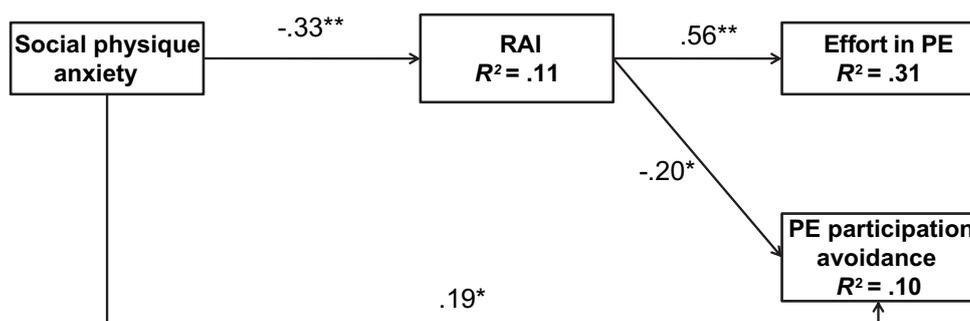


Fig. 2. Standardized path coefficients and amount of variance explained in the model testing the relative autonomy index (RAI) as a mediator. R^2 = amount of variance explained. * $p < .05$. ** $p < .01$.

2009), both of these approaches have their shortcomings and fail to capture a complete representation of students' complex motivational patterns.

An interesting direction for future research is to extend these two approaches by considering the different combinations of motivation regulations along with students' levels of SPA in physical education in relation to different affective and behavioral outcomes in class. Given the small amount of variance these models explained in motivation, it could be that SPA and motivation are relatively independent. That is, some individuals with SPA experience more autonomous motivation while others experience more external regulation or are simply amotivated. The relationship between SPA and motivation may depend on the extent to which individuals experience fulfillment of the psychological needs for competence, autonomy and relatedness that are needed to experience more autonomous motivation (Ryan & Deci, 2007). This may explain why SPA had only a weak correlation with self-reported effort in this study as well as some equivocal findings in the literature regarding the relationship between SPA and physical activity levels (Brunet & Sabiston, 2009; Crocker, Sabiston, Kowalski, McDonough, & Kowalski, 2006). For example, students with higher SPA and greater perceptions of competence, autonomy and relatedness will experience more autonomous motivation and, in turn, put forth more effort compared to students with higher SPA, lower perceptions of competence, autonomy and relatedness and more controlling motivation. Investigation of these potential interactions with a larger sample size using hierarchical regression analysis or cluster analysis appears an important direction for future research.³

The relationships between motivation regulations and behavior largely support self-determination theory (Ryan & Deci, 2007) and past physical education motivation research (e.g., Lonsdale et al., 2009; Ntoumanis, 2005). Students who had more autonomous motivation reported exerting more effort in class and those who were more amotivated did not try as hard in class. Interestingly, students with higher introjected regulation also reported higher effort in class. The unexpected positive relationship between introjected regulation and effort suggests that for this sample internal pressures have adaptive consequences. Though this is a more controlling form of motivation, past research has shown that it associates with some positive outcomes including the intention to be physically active in the future (Standage et al., 2003). Further, compulsory physical education may represent an environment that links more controlling forms of motivation with effort (i.e., effort is linked with grades). External regulation did not relate to either type of behavior and this is largely consistent with physical education motivation research (Ntoumanis, 2001; Standage et al., 2005). Both the unexpected and nonsignificant findings highlight the importance of examining how combinations of motivation regulations relate to behavioral outcomes as the relationship between introjected regulation or external regulation and behavior may depend on whether students also endorse more

autonomous motivation (see Ullrich-French & Cox, 2009). Finally, students with higher SPA were more likely to bring in a note to get out of participating in physical education even though they were perfectly able to participate. Results showed that higher SPA students do not choose to avoid participation *because* they are more amotivated, but rather, in *addition* to being more amotivated.

Several limitations of this study are critical to note and should be addressed in future research on SPA. First, it should be noted that using path analysis to test mediation may imply cause-and-effect or temporal order, but the cross-sectional design of our study precludes such implications. Future research on mediation with prospective data is necessary to truly detect mediating influence. The cross-sectional design also limits the stability of the relationships between variables. Examining how SPA, motivation and behavior covary over time may provide additional insight into the true nature of these relationships. Second, only self-report measures of study variables were utilized which can be susceptible to social desirability bias, particularly in the case of self-reported height and weight, effort and avoidance behavior. Using objective measures of BMI and behavior (Lonsdale et al., 2009) or additional measures of avoidance behaviors (e.g., via teacher report) may provide valuable information that would help validate the findings of the current study. On a related note, the single-item self-report measure of participation avoidance provided only a glimpse of this broader behavioral construct. The significant link between SPA and this single item suggest further exploration of this construct is warranted. Third, the sample size was relatively small and included more females compared to males. This may have prevented the detection of significant moderating variables (e.g., gender, grade) which should be investigated with larger, more representative samples. Also, the number of cases was adequate for using path analysis (Kline, 2005), but was not deemed appropriate (i.e., case to parameter estimate ratio was not sufficient) for conducting full structural equation modeling. However, the ability to model measurement error is a more optimal analysis strategy.

Finally, the social relationship variables were limited to those that were conceptualized as positive or supportive in nature due to their documented importance in supporting adaptive motivational experiences in the physical education setting (e.g., Cox et al., 2009; Cox & Williams, 2008). An interesting direction for future research would be identifying negative peer relationship variables that may be salient to SPA in the physical education context. For example, Mack et al. (2007) found that the extent to which adolescents experienced weight-related pressure from their peers related positively to SPA. The prevalence of weight-related discussions and pressure or teasing about weight in a physical education class likely contributes to SPA in the physical education setting.

This study represents one of the few investigations of SPA in the physical education setting and the first to examine the relevance of social relationships in this context. It also extends past theoretical work utilizing self-determination theory to better understand the relationship between SPA and behavior. In doing so, it offers several key contributions to the SPA literature. The first is that higher levels of SPA were linked to less autonomous motivation and more external regulation, amotivation and avoidance of participation in class. Second, although the RAI seems to mediate the relationship between SPA and self-reported effort, individual regulations do not. Finally, general feelings of peer acceptance may help buffer against higher feelings of SPA within this setting, though longitudinal research is needed to adequately support this statement. The overall pattern of relationships is consistent with a wide body of research on adolescent physical activity demonstrating that more autonomous motivation and perceptions of peer acceptance are associated with more positive physical activity experiences (see Weiss & Amorose, 2008). Therefore, educators may be alerted to an

³ Though we did not measure perceptions of competence, autonomy and relatedness in this study, we did explore potential interactions between SPA and motivation regulations in predicting effort and avoidance. We ran two hierarchical regression analyses predicting effort in physical education and participation avoidance as dependent variables. Gender, grade and BMI were entered in step 1 of each analysis, followed by SPA and motivation regulations (autonomous motivation, introjected and external regulations, amotivation) and finally, the 2-way interaction terms between each regulation and SPA. The interaction terms explained a small but significant ($p < .05$) amount of variance in both effort ($\Delta R^2 = .06$) and avoidance behavior ($\Delta R^2 = .08$). First, autonomous motivation had a positive relationship with effort only when SPA is lower. Second, introjected regulation had a positive relationship with effort only when SPA is higher. Finally, amotivation had a strong, positive relationship with avoidance only when SPA is higher.

additional reason to foster an environment that supports autonomous motivation and social acceptance, namely to help guard against the negative experience of SPA. Researchers are encouraged to explore more complex perspectives on the relationship between SPA and motivation in understanding behavioral outcomes in the physical education setting.

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