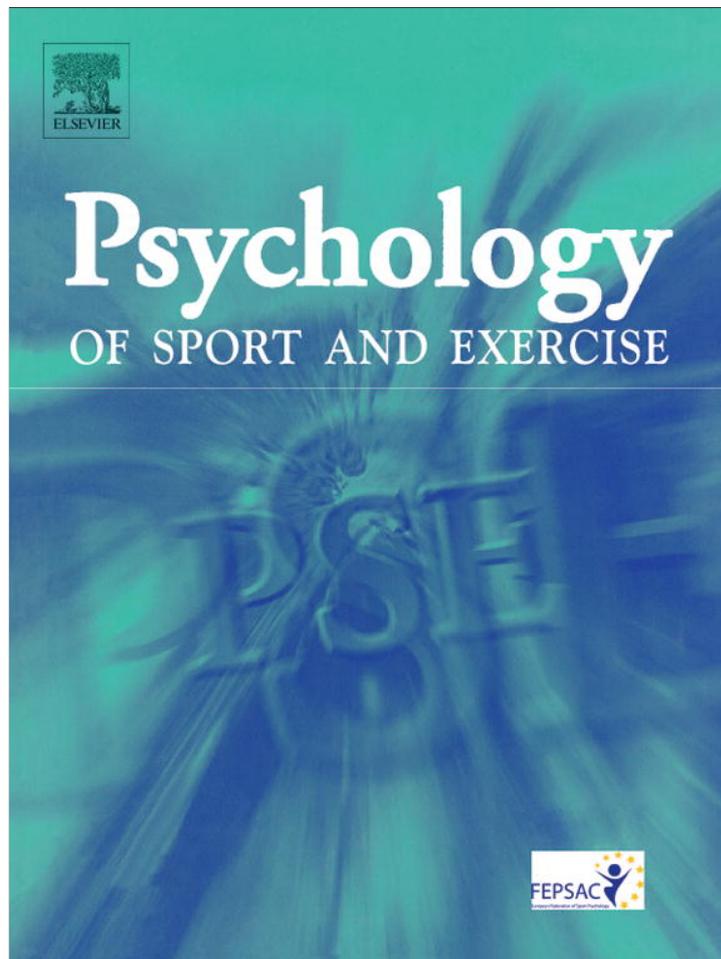


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Using motivation regulations in a person-centered approach to examine the link between social physique anxiety in physical education and physical activity-related outcomes in adolescents

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ABSTRACT

Objectives: This study explored how social physique anxiety (SPA) combined with different patterns of motivation regulations might facilitate versus deter effort and enjoyment in physical education (PE) and leisure-time physical activity.

Design: Cross-sectional survey.

Methods: High school students ($N = 298$; $M_{\text{age}} = 15.72$, $SD_{\text{age}} = 1.24$ years) completed an in-class survey including SPA in PE, motivation regulations for PE, enjoyment and effort in PE and leisure-time physical activity.

Results: Four profiles of students were identified in cluster analysis based on autonomous motivation, introjected regulation, external regulation and SPA. Profile one (“high diverse motivation”; $n = 84$) reflected relatively high motivation across all regulations and average SPA. Profile two (“moderate autonomous motivation”; $n = 92$) included those with average scores on autonomous motivation and relatively low scores on introjected and external regulation and SPA. Profile three (“moderate diverse motivation and anxious”; $n = 59$) had relatively high SPA combined with average motivation regulations. Profile four (“externally controlled and anxious”; $n = 63$) also had relatively high SPA but relatively low autonomous motivation and introjected regulation and relatively high external regulation. MANOVA results showed that “externally controlled and anxious” students reported the lowest physical activity behavior and enjoyment in PE. Conversely, the “moderate diverse motivation and anxious” students have physical activity experiences that do not differ from the two profiles that exhibited lower SPA.

Conclusions: Higher feelings of SPA in PE appear linked with lower levels of enjoyment and effort in PE and leisure-time physical activity outside of school only when coupled with higher external regulation. This finding helps explain inconsistent associations between SPA and physical activity outcomes.

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Participating in high school physical education (PE) can be a stressful experience for some adolescents (Carlson, 1995). Aside from concerns regarding lack of skill and competence to participate and/or compete in the various sport and physical activities offered during PE classes (Carlson, 1995), there is a confluence of social and developmental factors that can increase students' apprehension about performing and/or displaying their bodies in front of others (Harter, 1999; Levine & Smolak, 2002; Smith, 2003). Some of these factors include a heightened sense of social self-consciousness, variability in maturation rates, the strong need for peer acceptance, and the

importance of feeling physically attractive for one's self-esteem. The intersection of these factors within the social context of PE may predispose students to experience greater social physique anxiety (SPA), which is distress stemming from the perception that others are evaluating their bodies in a negative manner (Hart, Leary, & Rejeski, 1989). SPA is more likely to occur in settings like PE where displays of competence or incompetence are made publicly and reflected in physical performance and appearance (Carlson, 1995; Carron & Prapavessis, 1997; Crombie, Brunet, & Sabiston, 2011; Hart et al., 1989).

Social physique anxiety and physical education

Reports of SPA during PE classes are of concern since these negative affective experiences are associated with avoidance of

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class participation (Cox, Ullrich-French, Madonia, & Witty, 2011; Kowalski, Mack, Crocker, Niefer, & Fleming, 2006; Sabiston, Sedgwick, Crocker, Kowalski, & Mack, 2007). Through interviews, Sabiston et al. found that PE class fostered SPA experiences in adolescent girls, and participants reported getting notes from parents to get out of class. Similarly, Cox et al. discovered a significant positive relationship between SPA in PE and using a note to avoid participating in PE in a multivariate path analysis. Hart et al. (1989) proposed that behavioral avoidance is a likely SPA coping strategy, and PE seems to provide an opportune context to perpetuate SPA experiences and foster physical activity avoidance. This is unfortunate given the multitude of positive physical, affective, cognitive, and social benefits that have been associated with PE participation (though these outcomes are dependent on social factors; Bailey et al., 2009). Furthermore, coping strategies associated with SPA experiences include negative affect, deflection, and cognitive avoidance, in addition to behavioral avoidance (Brewer, Diehl, Cornelius, Joshua, & Van Raalte, 2004; Kowalski et al., 2006; Sabiston et al., 2007). As such, adolescents may experience less enjoyment in PE and exert less effort in class activities when experiencing SPA. Alternatively, some individuals channel the experience of SPA toward adaptive outcomes, and increase their effort during activities that perpetuate SPA as well as report acceptance of the situation and reappraisal (Kowalski et al., 2006; Sabiston et al., 2007). These strategies may be in line with Hart et al.'s (1989) second proposition that both maladaptive and adaptive strategies may be used to manage SPA. It is not clear, however, what factors may determine whether SPA will lead to the promotion of maladaptive or adaptive outcomes.

Social physique anxiety and physical activity

Heightened SPA in PE also may have implications for relevant outcomes that extend beyond the PE setting such as physical activity levels. For example, there is research evidence that emotions (Cox, Smith, & Williams, 2008; Gordon-Larsen, McMurray, & Popkin, 2000; Van der Horst, Paw, Twisk, & Van Mechelen, 2007) and behaviors (Cox et al., 2008) in the context of PE may generalize to leisure-time physical activity. Most of the research evidence linking SPA and physical activity has demonstrated ambiguous results, with some evidence of negative associations and others with little to no significant association (Crocker, Sabiston, Kowalski, McDonough, & Kowalski, 2006; Hausenblas, Brewer, & Van Raalte, 2004; Kowalski, Crocker, & Kowalski, 2001; Kowalski et al., 2006; Lantz, Hardy, & Ainsworth, 1997; Melbye, Tenenbaum, & Eklund, 2008). These inconclusive results mirror the proposition that SPA can perpetuate both adaptive and maladaptive outcomes (Hart et al., 1989). Given these ambiguous findings, it is important to identify mechanisms that may explain the association between SPA and physical activity. In this study, we propose that motivation regulations may be integral to explaining the relationship between SPA experiences in PE and both PE outcomes and leisure time physical activity.

Self-determination theory, social physique anxiety, and physical education and physical activity outcomes

Self-Determination Theory (SDT; Ryan & Deci, 2007) defines motivation regulations as the reasons why individuals engage in a specific behavior. Organismic integration theory (OIT), a sub-theory of SDT, details how these distinct regulations range from being completely autonomous or emanating from within the individual to being completely controlling or originating from a source outside of the individual (Ryan & Deci, 2007). The autonomous regulations include intrinsic motivation (e.g., participating

in PE because it is fun), integrated regulation (e.g., participating in PE because it is consistent with students' life goals) and identified regulation (e.g., participating in PE because it is valued or important to the student). The controlling regulations include introjected regulation (e.g., participating in PE in order to avoid shame or gain pride/social approval) and external regulation (e.g., participating in PE in order to satisfy an external contingency like avoiding punishment or earning a good grade). More autonomous forms of PE motivation are consistently linked with greater enjoyment in PE and physical activity levels both within and outside of the PE setting (e.g., Cox et al., 2008; Lonsdale, Sabiston, Raedeke, Ha, & Sum, 2009; Ullrich-French & Cox, 2009). These findings are in line with OIT perspectives, such that motivation regulations that are more autonomous in nature are expected to relate to more positive affective and behavioral outcomes compared to regulations that are more controlling.

Researchers have linked SPA experiences to more controlling types of motivation regulations (Brunet & Sabiston, 2009; Crawford & Eklund, 1994; Sabiston, Crocker, & Munroe-Chandler, 2005; Thogersen-Ntoumani & Ntoumanis, 2006). Furthermore, a few studies have used an SDT framework to test the role of motivation in the relationship between SPA and physical activity behavior in different settings including PE (Brunet & Sabiston, 2009; Cox et al., 2011; Gillison, Standage, & Skevington, 2006). Brunet and Sabiston found that autonomous motivation, represented by a relative autonomy index, mediated the association between SPA and physical activity among older adolescents. Specifically, higher SPA predicted less autonomous motivation which, in turn, predicted lower physical activity levels. In an extension of this research, Cox et al. (2011) tested the mediating roles of individual motivation regulations in the relationship between SPA and participation behaviors in a high school PE setting. Though SPA negatively predicted autonomous motivation and positively predicted external regulation and amotivation, the mediating role of motivation regulations was not supported and SPA did not predict students' self-reported effort in PE. Therefore, these studies provide mixed support for the mediating role of motivation regulations in the relationship between SPA and physical activity behavior, and suggest that the relationships among SPA, motivation regulations and physical activity outcomes may be more complex.

A viable explanation for the mixed findings regarding the relationship between SPA, motivation regulations, and both PE outcomes and physical activity behavior is that it may depend on the unique combinations of motivation types that individuals possess. A person-centered approach would allow for an examination of how different combinations of SPA and motivation regulations relate to PE and physical activity outcomes. Though they did not examine motivation from an SDT perspective, Niven, Fawcner, Knowles, Henretty, and Stephenson (2009), used a person-centered approach to identify subgroups of early adolescent females based on motives for physical activity. They then examined the relationship between SPA and physical activity for each subgroup and found that only females with strong appearance- and fitness-related motives experienced lower levels of physical activity when they had higher SPA. These findings suggest that students experiencing higher SPA in PE may reduce their effort in PE only when driven by certain types of motives. Therefore, the association between SPA in PE and relevant physical activity outcomes may depend on the motivational characteristics of the individual. This proposition has yet to be examined with motivation regulations in the context of PE, where the body is often on display and exposed for judgment and appraisals by others.

The purpose of this study was to use a person-centered approach (i.e., cluster analysis) to identify different profiles of students based on levels of PE motivation regulations and SPA in PE in

a high school setting. After identifying distinct profiles that represented the diversity of student experiences within the PE context, we tested for differences in relevant affective (i.e., enjoyment in PE) and behavioral (i.e., self-reported effort in PE and self-reported leisure-time physical activity outside of class) outcomes across profiles. The identification of different combinations of PE motivation regulations and SPA was exploratory and therefore specific profiles were not hypothesized. However, we did anticipate that emergent profiles that were characterized by greater autonomous motivation, regardless of levels of controlling forms of motivation (Ullrich-French & Cox, 2009) or SPA, would associate with greater enjoyment, effort and leisure-time physical activity. Conversely, profiles that included higher levels of controlling forms of motivation and SPA and lower autonomous motivation would associate with lower levels of enjoyment, effort and leisure-time physical activity.

Methods

Participants and procedure

After study approval was secured through the Institutional Review Board, high school students in grades 9 through 12 were invited to participate in a study assessing SPA and motivation-related constructs in their PE class. Those students who returned signed parental consent forms and gave their assent were administered a survey assessing study variables twice in the school gymnasium during a regularly scheduled PE class 4 months apart. Data for the current study are taken from the first data collection ($N = 298$; $M_{\text{age}} = 15.72$, $SD_{\text{age}} = 1.24$ years; 60% female; 87% White).

Measures

Social physique anxiety

The degree to which students felt anxious about the appearance of their body to others in PE class was measured with 8 items from the Social Physique Anxiety Scale (Hart et al., 1989). The items on this scale were based on the 9-item version (Martin, Rejeski, Leary, McAuley, & Bane, 1997) but were contextualized to refer to SPA in PE and 1 item about being in a bathing suit was deleted due to lack of relevance to this setting. Students responded to each item based on a scale from *not at all characteristic of me* (1) to *extremely characteristic of me* (5). Studies have supported the validity and reliability of scale scores using contextualized versions of these items (Brunet & Sabiston, 2011).

Motivation regulations

Intrinsic motivation, identified regulation, introjected regulation and external regulation were measured with 4 items each from the Perceived Locus of Causality Scale (Goudas, Biddle, & Fox, 1994). This scale does not include integrated regulation because this type of motivation has not been shown to be a valid experience for children or adolescents (Ryan & Connell, 1989). The scale begins with the phrase, "I take part in PE class..." followed by items reflecting the different types of motivation regulation. Students responded to these items on a 7-point scale ranging from *strongly disagree* (1) to *strongly agree* (7). An abundance of PE research has supported the reliability and validity of these motivation subscale scores (Cox et al., 2011; Ntoumanis, 2005).

Enjoyment

Students reported how much fun they had engaging in activities during PE class by responding to two items modified from Scanlan, Carpenter, Schmidt, Simons, and Keeler (1993) sport enjoyment scale ("Do you have fun doing different activities/sports in PE in

general?" and "Do you like doing activities in PE in general?"). The internal consistency reliability and construct validity of similar items has been supported in past PE research (Ullrich-French & Cox, 2009).

Physical activity behavior

The Physical Activity Questionnaire for Adolescents (PAQ-A; Kowalski, Crocker, & Kowalski, 1997) was used to assess physical activity during PE (1 item; "In the last 7 days, during your PE classes, how often were you *very active* (playing hard, running, jumping, throwing)?") and physical activity during students' leisure time (5 items). The leisure-time items measure the amount of moderate-to-vigorous physical activity students engaged in over the past 7 days after school, in the evening, over the weekend, during all free time, and on each day of the week. Students respond on a scale from 1 to 5 (except for the PE item which was on a 1–4 scale), with higher scores indicating higher activity levels. These items have demonstrated acceptable reliability and validity in research with middle school PE students (Ullrich-French & Cox, 2009).

Demographics

Students reported their age and race (e.g., Black, White, Hispanic, etc.) as well as their height in inches and weight in pounds. These numbers were converted to centimeters and kilograms, respectively and then used to calculate their body mass index (BMI) percentile based on height, weight, age in months and sex (Kuczmarowski et al., 2002).

Data analysis

Data screening for normality and outliers was conducted first. Next, descriptive statistics including means, standard deviations, and bivariate correlations were conducted. To address the study purpose, a two-step approach to conducting cluster analysis was used to identify profiles of motivation regulations and SPA in PE. Standardized scores of SPA and each motivation regulation were used in the cluster analyses. First, a hierarchical clustering procedure was conducted using Ward's Method and squared Euclidian distance to help determine the appropriate number of clusters and to generate initial cluster centers. Second, a non-hierarchical K -means cluster analysis was conducted specifying plausible cluster solutions generated from the hierarchical procedure. To examine whether resulting profiles differed in enjoyment and effort in PE and leisure-time physical activity, a MANOVA was conducted specifying cluster membership as the fixed factor. A significant multivariate effect was followed up to explore specific profile differences.

Results

Descriptive statistics revealed that item scores on the respective scales were internally consistent (α range = .77–.95) and were distributed normally (skewness range: $-.98$ to $.81$; kurtosis range: -1.02 to $.86$) and no cases were identified as either univariate or multivariate outliers. Given the high correlation between intrinsic motivation and identified regulation ($r = .84$), an autonomous motivation score was created by combining these two subscales and used in subsequent analyses. On average, students reported moderate levels of motivation regulations, and enjoyment and effort in PE and low to moderate levels of SPA in PE and physical activity during leisure time. Students had an average BMI of 23.91 kg/m^2 ($SD = 5.38$), with 64.6% classified as healthy weight, 1.5% underweight, and 33.9% overweight or obese based on the U.S.

Centers for Disease Control guidelines (Kuczmarski et al., 2002). See Table 1 for bivariate correlations and descriptive statistics.

Cluster analysis

The results of the hierarchical cluster analysis suggested that a 2, 3 or 4 cluster solution would be most appropriate. Therefore, these solutions were explored and a four cluster solution appeared to provide additional unique profiles compared to the 2- and 3-cluster solutions without being redundant across profiles. Using saved initial cluster centers, a K-Means cluster analysis was then conducted specifying a four cluster solution. The solution was replicated with high precision between two randomly selected sub-samples, indicating stability of profiles. Fig. 1 illustrates the four distinct motivation/SPA profiles. Z-scores of ±0.5 or greater were interpreted as being either relatively higher or lower than the sample mean. Table 2 displays the means and standard deviations of the clustering variables for each profile. The first profile (“high diverse motivation”) reflected high motivation ($n = 92$) with relatively high scores on autonomous motivation and introjected and external regulations, and average SPA in PE. The second profile (“moderate autonomous motivation”; $n = 84$) included those participants with average scores on autonomous motivation and relatively low scores on introjected and external regulation and SPA in PE. The third profile (“moderate diverse motivation and anxious”; $n = 59$) had relatively high SPA in PE combined with average motivation regulations (though autonomous motivation nearly met the 0.5 criterion). The fourth profile (“externally controlled and anxious”; $n = 63$) also had relatively high SPA in PE but this profile had relatively low autonomous motivation and introjected regulation and relatively high external regulation. Examination of mean scores suggests that even the “high SPA” groups had only moderate SPA scores (see Table 2).

For descriptive purposes, we examined whether cluster membership differed on the demographic variables of grade, gender and BMI percentile. Membership did not differ by grade ($\chi^2 = 10.24, p = .33$), but did differ by gender ($\chi^2 = 12.29, p = .006$) with Clusters 3 (“moderate diverse motivation and anxious”) and 4 (“externally controlled and anxious”) favoring female membership. Results of an ANOVA showed BMI percentile also differed by cluster membership ($F_{(3, 276)} = 4.41, p = .05$) with only Cluster 1 (“high diverse motivation”; lowest BMI percentile) and Cluster 3 (“moderate diverse motivation and anxious”; highest BMI percentile) differing significantly. This indicates that the clusters with higher SPA were more likely to contain females and have a higher BMI percentile (Cluster 3 only compared with Cluster 1). Therefore, gender and BMI percentile were included as covariates in the main analyses.

Cluster differences

A MANOVA with cluster membership as the fixed factor and enjoyment of PE, effort in PE, and leisure-time physical activity as dependent variables revealed a significant multivariate effect (Pillai's Trace = .26, $F_{(9, 825)} = 8.72, p < .001, \eta_p^2 = .09$). Gender and BMI percentile were not significant and were removed. Follow up analyses indicated that enjoyment of PE ($\eta_p^2 = .13$), effort in PE ($\eta_p^2 = .14$), and leisure-time physical activity ($\eta_p^2 = .14$) were significantly ($p < .001$) different. Pairwise comparisons of the estimated marginal means were used to identify specific cluster differences. Cluster 4 (“externally controlled and anxious”) had lower enjoyment in PE ($p < .001$), lower effort in PE ($p < .001$), and lower leisure-time physical activity ($p < .001, p = .004, p = .003$, for cluster 1, 2, 3, respectively) compared to all other clusters. In addition, cluster 1 (“high diverse motivation”) had higher leisure-time physical activity ($p < .01$) compared to cluster 2 (“moderate autonomous motivation”). Table 3 displays the means and standard deviations of the dependent variables for each profile.

Discussion

The purpose of this study was to examine the complexity of the relationship between SPA in PE and physical activity outcomes within and outside of the PE setting by identifying unique clusters of SPA and motivation regulations. Results uncovered four unique motivation/SPA profiles that differed on enjoyment and effort in PE and leisure-time physical activity. Differences between the “moderate diverse motivation and anxious” and the “externally controlled and anxious” profiles illustrate the potential for motivation regulations to moderate the relationship between SPA and physical activity outcomes. Specifically, elevated levels of SPA were detrimental to students' enjoyment of PE and physical activity behaviors when paired with higher external regulation and lower autonomous motivation, whereas students who experienced higher SPA in PE paired with moderate to higher levels of autonomous motivation and lower external regulation appear to have positive experiences within this context. In using a person-centered approach, we were able to identify that adolescents in the “externally controlled and anxious” profile, characterized by higher SPA and external regulation and lower autonomous motivation and introjected regulation, were distinct from those in other clusters. Higher SPA coupled with more controlling motivation was related to lower enjoyment, effort in PE and physical activity levels outside of PE. Researchers have consistently shown that the most negative experiences are reported among individuals who are driven primarily by controlling forms of motivation (particularly external regulation;

Table 1
Descriptive statistics for study variables.

Variable	1	2	3	4	5	6	7	8	9
1 Social physique anxiety	.86								
2 Intrinsic motivation	-.10	.87							
3 Identified regulation	-.06	.84**	.89						
4 Autonomous motivation	-.08	.95**	.97**	.93					
5 Introjected regulation	.13*	.52**	.64**	.61**	.77				
6 External regulation	.22**	-.16**	-.04	-.10	.32**	.78			
7 PE Enjoyment	-.04	.57**	.57**	.60**	.38**	-.13*	.81		
8 Effort in PE	-.13*	.36**	.43**	.41**	.26**	-.09	.31**	–	
9 Leisure-time physical activity	-.17**	.39**	.49**	.46**	.37**	-.00	.29**	.36**	.91
Possible Range	1–5	1–7	1–7	1–7	1–7	1–7	1–5	1–4	1–5
M	2.57	4.02	4.29	4.15	3.55	3.86	3.56	3.39	2.80
SD	.91	1.52	1.75	1.57	1.48	1.57	1.05	.73	1.15
N	298	298	298	298	298	298	281	296	297

Notes: Alpha values in bold along the diagonal. Correlation values below diagonal. * $p < .05$, ** $p < .01$ (2-tailed).

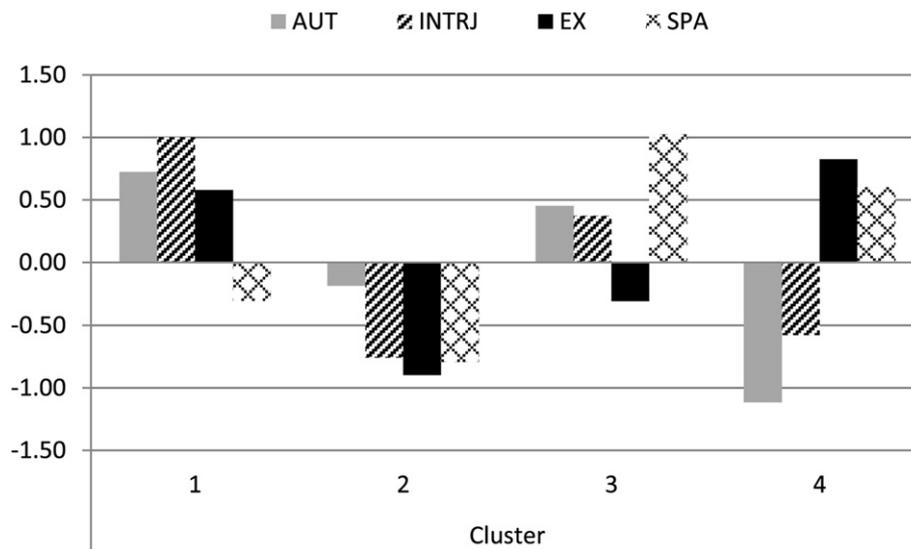


Fig. 1. Four cluster solution based on Z-scores.

Ullrich-French & Cox, 2009; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). The characteristics of the “externally controlled and anxious” profile also support research showing a positive association between SPA and more controlling motivation as well as lower physical activity levels (Brunet & Sabiston, 2009; Thogersen-Ntoumani & Ntoumanis, 2006). However, as our results show, students with relatively higher levels of SPA are not always driven by controlling forms of motivation, nor do they necessarily avoid physical activity.

Adolescents in the “moderate diverse motivation and anxious” cluster illustrate how relatively higher levels of SPA paired with average (i.e., moderately high in this sample) autonomous motivation is associated with positive PE experiences and behaviors. These students reported the highest levels of SPA in PE, and experienced significantly greater enjoyment and effort in PE and leisure-time physical activity compared to the “externally controlled and anxious” cluster. The differences between the “moderate diverse motivation and anxious” and “externally controlled and anxious” clusters parallel the results of Niven et al. (2009) who showed that SPA associated with lower physical activity only for those with more extrinsic reasons for exercise (i.e., appearance and fitness-related motives). Differences in motivation regulation patterns may explain why SPA appears to hinder physical activity participation in some instances and promote it in others. It appears

students with moderately-high SPA can have fun in PE, try hard and be active during their leisure time when also driven by autonomous motivation.

The PE and physical activity experiences of students across the clusters also support study hypotheses and the SDT theoretical perspective (Ryan & Deci, 2007) by showing that autonomous forms of motivation are positively linked with adaptive experiences and behaviors regardless of levels of SPA or more controlling motivation regulations. For example, students in the three clusters (1, 2, & 3) reporting average to higher autonomous motivation all engaged in significantly more leisure-time physical activity compared to the “externally controlled and anxious” cluster (reporting lower autonomous motivation) even though they varied widely in their degree of SPA and external regulation. Ullrich-French and Cox (2009) similarly found that middle school PE students who were high in both autonomous and controlling forms of motivation as well as students with high autonomous motivation and lower external regulation reported the most positive outcomes (e.g., enjoyment, effort, value of PE). The cluster analysis approach enables researchers to examine motivation in a way consistent with organismic integration theory, such that individuals can have various levels of each motivational regulation, rather than the static view that individuals predominantly foster one regulation over others. The findings of the current study also support previous

Table 2
Profile means, standard deviations, and Z-scores on clustering variables.

	Profiles							
	1 N = 84		2 N = 92		3 N = 59		4 N = 63	
	High diverse motivation		Moderate autonomous motivation		Moderate diverse motivation and anxious		Externally controlled and anxious	
	M (SD)	Z	M (SD)	Z	M (SD)	Z	M (SD)	Z
Autonomous motivation	5.29 (1.01)	0.72*	3.86 (1.49)	-0.19	4.86 (.96)	0.45	2.40 (.93)	-1.12*
Introjected regulation	5.04 (.93)	1.00*	2.43 (.92)	-0.76*	4.11 (.93)	0.37	2.70 (1.17)	-0.58*
External regulation	4.77 (1.06)	0.58*	2.46 (1.13)	-0.90*	3.38 (1.04)	-0.31	5.16 (1.19)	0.83*
Social physique anxiety	2.29 (.60)	-0.30	1.85 (.52)	-0.79*	3.51 (.57)	1.03*	3.12 (.89)	0.60*

Note: *Z-scores greater than ± 0.5 were interpreted as relatively higher or lower than the sample average.

Table 3
MANOVA follow-up results comparing the 4 clusters (N = 279).

	Clusters				F	η_p^2
	1 High diverse motivation	2 Moderate Autonomous motivation	3 Moderate diverse motivation And anxious	4 Externally controlled and anxious		
	M (SD)	M (SD)	M (SD)	M (SD)		
PE enjoyment	3.89 (.93) ^a	3.59 (1.07) ^a	3.83 (.69) ^a	2.88 (1.16) ^b	13.44*	.13
Effort in PE	3.61 (.58) ^a	3.43 (.71) ^a	3.58 (.61) ^a	2.88 (.81) ^b	15.24*	.14
Leisure-time physical activity	3.36 (1.10) ^a	2.77 (1.11) ^b	2.86 (1.08) ^{ab}	2.15 (.94) ^c	14.59*	.14
N	80	88	52	59		

Notes: Different superscripts indicate significant differences between clusters on the outcome variables.

* $p < .001$.

researchers' conclusions and theoretical tenets that autonomous motivation is important for adaptive physical activity affective and behavioral experiences (Cox et al., 2008; Gillison et al., 2006; Standage, Gillison, Ntoumanis, & Treasure, 2012). Based on the findings of the current study, it may be useful for teachers and others working with high school students to support autonomous motivation, especially in order to foster positive behavioral change for those with higher SPA.

Notably, the two forms of more controlling motivation (i.e., introjection and external regulation) do not appear to act in concordance. Supporting past motivation profile research (Ullrich-French & Cox, 2009), when external regulation is not combined with autonomous motivation and introjected regulation, it seemed to be most detrimental for students' PE and physical activity experiences whereas introjected regulation was more closely associated with autonomous motivation in all four clusters. Motivation grounded in gaining pride or avoiding guilt may reflect a greater investment in or internalization of the target behavior, which should be linked with more autonomous motivation. Results also support a growing body of research showing the adaptive role that introjected regulation can play in promoting physical activity behavior (Gillison, Osborn, Standage, & Skevington, 2009; Sabiston et al., 2010; Thøgersen-Ntoumani & Ntoumanis, 2006). These findings may be illustrative of the reparative and positive nature of emotions such as guilt that are highly tied to introjected regulation (Sabiston et al., 2010). However, caution should be used to emphasize the behavior (i.e., physical activity) rather than the individual's attributes in order to avoid perpetuating experiences of shame.

Interestingly, the two clusters with higher SPA had varying degrees of introjected regulation while the more adaptive "high diverse motivation" cluster had a high level of introjected regulation and a low level of SPA. These patterns of motivation regulation indicate that SPA does not always accompany motivation derived from feelings of guilt or ego enhancement. Thus, the modest positive relationship between SPA and introjected regulation that has been revealed in some research may oversimplify the role of SPA in motivational processes (e.g., Thøgersen-Ntoumani & Ntoumanis, 2006). Based on the current findings and other person centered research (e.g., Ullrich-French & Cox, 2009; Vansteenkiste et al., 2009), it appears important to consider the overall pattern of motivation regulations to gain a more refined perspective on associated outcomes, including how SPA links with affective and behavioral outcomes.

In spite of the unique contributions of this study, there are limitations that should be noted. First, the cross-sectional nature of the data prohibits the examination of causal pathways between the SPA/motivation profiles and the consequences of enjoyment, effort, and leisure time physical activity. Future research examining these constructs over time will better test the direction of relationships between SPA/motivation and various outcomes. Second, the effect

sizes were relatively modest and represent the experiences of one sample of high school students, relatively homogeneous in ethnicity and socioeconomic status. As cluster analysis is a data driven approach, replication of the findings with independent samples using *K*-means clustering without specifying initial cluster centers and utilizing more sophisticated analytic strategies such as latent profile analysis will strengthen conclusions regarding the resulting profiles and the associated differences. Third, we combined intrinsic motivation and identified regulation to represent autonomous motivation and thus lost information about these two distinct types of motivation. Although this approach is not unusual, it will be helpful to consider the unique contributions of these two motivation regulations in regards to both SPA and affective and behavioral outcomes. Finally, the interpretation of profiles was determined by categorizing scores as relatively "high" or "low", which reflects a comparison to the average and not necessarily absolute levels of variables.

Overall, it appears that addressing the interconnections among SPA and motivation regulations helped uncover theoretical issues, practical recommendations, and important future directions. Researchers have shown that SPA can both promote and deter physical activity behaviors (Hausenblas et al., 2004; Sabiston et al., 2007). Thus a complex relationship emerges that has not been well understood in the exercise literature. We addressed this inconsistency by considering profiles of SPA and motivation regulations in physical education and their resulting differences on enjoyment and effort in PE, and leisure time physical activity behavior. In support of theoretical and empirical evidence, we found that SPA may be associated with adaptive experiences in PE but only when accompanied by autonomous motivation and low controlling motivation. By examining motivation regulations individually, we were able to identify how different combinations of SPA and motivation regulations may help explain the inconsistent links in the literature regarding SPA and motivation and behavior. These findings help advance the literature on body-related emotions by illuminating the dualistic nature of SPA and suggesting propositions to be tested in future research.

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