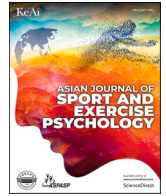




Contents lists available at ScienceDirect

Asian Journal of Sport and Exercise Psychology

journal homepage: www.elsevier.com/locate/ajsep

Social comparison in physical education: Impact of frames of reference, motives to compare, and self-determined motivation

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ARTICLE INFO

Keywords:

Physical education
Social comparison
Frames of reference
Motivational regulations

ABSTRACT

Physical education (PE) provides an important achievement setting for researchers to investigate social comparison processes, however, our understanding of how these processes function, and their consequences, remains limited in this setting. The present study aimed to determine the role of two frames of reference (the class and a chosen individual), motives for comparison, and motivational regulations in predicting physical self-concept (PSC), self-efficacy, and positive/negative affect in PE. Four hundred and ninety-one adolescents ($M_{age} = 14.75$, $SD = 0.90$ years, nested within 28 PE classes and nine teachers) completed a multi-section inventory assessing the key constructs. Multilevel modeling analysis showed that students' perceptions of ability compared to the class as a whole were pertinent in determining all outcomes whereas comparisons with an individual were less influential. As for the effects of motives for comparison, both self-efficacy and positive affect were positively predicted by self-evaluation and self-improvement. In terms of motivational regulations, findings suggested that more autonomous forms of motivation positively predicted PSC, self-efficacy and positive affect, and were inversely related with negative affect. The results also endorsed the utility of studying intrapersonal moderators of social comparisons in PE, and provide important implications for professional practice.

Physical education (PE) is a context experienced by most adolescents across the world. Specifically, within Western societies, adolescents must participate in PE as part of the curriculum. This provides not only a naturalistic setting for investigating psychological processes, but also an environment that helps to shape adolescents' physical abilities, competencies, and long-term physical activity (Armstrong & Welsman, 2006). Given the numerous benefits of physical activity participation (Guthold et al., 2020) and the knowledge that PE experiences can influence participation outside of the school environment (Kalajas-Tilga et al., 2019; Tilga et al., 2020), researchers must continue to investigate why some adolescents engage and develop positive self-perceptions in this setting and why others do not. One theory which may provide useful insight into adolescents' experiences in PE is Festinger's (1954) theory of social comparison processes.

According to this theory, people have an innate drive to evaluate themselves, often in comparison to others. While this perspective has been frequently used to investigate adults' physical activity-related behaviours (Diel et al., 2021; Huang et al., 2022; Nastasi et al., 2022), the literature aiming to advance the understanding of social comparison processes in younger age groups is scarce. Specifically, there are only a

few studies which have attempted to assess children's motives for comparison (e.g., Barnes & Spray, 2013; Lubbers et al., 2009), to investigate the frames of reference children use for comparison (Chanal & Sarrazin, 2007; Marsh et al., 2008) or to assess relationships between comparative ability and important educational and health outcomes (Chanal et al., 2005). To the best of our knowledge, no previous studies have proposed an integrative approach by linking social comparison with other theories in an attempt to better understand adolescents' experiences. Furthermore, social comparison research in education involving young people has, for the most part, addressed school settings from a general perspective. This leaves our knowledge about the physical education setting largely under researched.

Frames of reference

To compare oneself, there must be a target or frame of reference with which one can compare. Festinger (1954) proposed that subjective standards will only be used for comparison when an objective standard is not available. However, it has been demonstrated, and is now widely accepted, that subjective standards are used even when objective

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<https://doi.org/10.1016/j.ajsep.2023.06.001>

Received 21 January 2023; Received in revised form 30 April 2023; Accepted 14 June 2023

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standards are available (e.g., Klein, 1997). In this line, several frames of reference have been proposed in different settings (e.g., Chanal & Sarrazin, 2007; Marsh & Hau, 2003). Within physical education, however, the main focus has been on comparison with the class through the perceived relative standing in class (PRSC), or with a specific individual through the perceived relative standing compared to a chosen individual (PRSI; Chanal et al., 2005; Chanal & Sarrazin, 2007).

In order to examine and understand the effects of comparing with a frame of reference, we must also define the perceived ability of the target (i.e., the direction of the comparison). An individual can be perceived as more able than the comparer (upward comparison), less able (downward comparison), or equally able individual (lateral comparison). Direction of comparison links back to one of Festinger's (1954) original hypotheses where he proposed that individuals will choose to compare with those who are similar to themselves. Previous research concerning frame of reference effects has shown that children engage in simultaneous comparisons with multiple frames of reference with both positive and negative consequences (Chanal et al., 2005; Chanal & Sarrazin, 2007). Moreover, we can draw upon knowledge of adults, where Locke (2007) for example, found that the generalised other tended to have a more significant impact on emotional consequences (after an upward comparison) than when comparing with a specific individual. This may be due to the generalised other providing a more 'accurate' evaluation of the self as opposed to comparison with one individual with whom a negative comparison may be easier to overcome. In contrast, Buckingham and Alicke (2002) found that the effects of comparison with a generalised other could be moderated by the presence of a co-actor. These differing results highlight the need for research investigating multiple frames of reference, and how the influence of these may vary depending on the context of comparison.

Motives for comparison

Research investigating motives for comparison has stemmed from Festinger's (1954) first hypothesis, that humans use social comparisons to evaluate their opinions and capabilities. This motive for comparison has been challenged as humans only reason for comparing (Helgeson & Mickelson, 1995; Lubbers et al., 2009; Wood, 1989) and the motives to self-improve and self-enhance are now recognised as motives for comparison with objective and subjective comparison standards. Research investigating the motives that drive young people to compare is still in its infancy with less than a handful of studies in this area having been completed (Barnes & Spray, 2013; Lubbers et al., 2009). Lubbers et al. (2009) demonstrated that children engage in comparisons for many different reasons including that of proximity. Additionally, results demonstrated similarities between adolescents' motives for comparison and those which have previously been identified in adult samples, for example self-enhancement and self-improvement (Helgeson & Mickelson, 1995; Wood, 1989). These two motives for comparison have received attention in youth. This study aims to assess students' motives for comparison in PE in predicting the four important consequences: physical self-concept, self-efficacy, and positive and negative affect.

Consequences of comparison

The behavioural, emotional, and cognitive consequences of comparison in achievement settings remain relatively under-researched (Barnes & Spray, 2013; Butler, 1992; Chanal et al., 2005; Chanal & Sarrazin, 2007). Specifically in PE, research has focused primarily on physical self-concept (PSC). Research investigating PSC in PE has found that relationships vary dependent upon the frame of reference in question (Chanal et al., 2005; Chanal & Sarrazin, 2007). For example, Chanal and Sarrazin (2007) demonstrated that upward comparisons with a small group served to boost PSC, whereas Chanal et al. (2005) found a negative relationship between class average ability and PSC which increased over the 10-week study period.

In contrast to these findings, Margas et al. (2006) assigned children to different classes based on ability. Although not directly measuring PSC, the study did assess self-evaluations. The results showed an initial increase in self-evaluations of children selected to the high ability class which then decreased over the study period to pre-selection levels and may explain the decrease in PSC found by Chanal et al. (2005). Drawing the findings together concerning PSC, the evidence suggests that the class average is related to level of PSC, but that other factors such as categorization may also play a role. Therefore, research which continues to investigate these relationships is needed to provide a stronger and more diverse understanding of these relationships.

Other consequences of comparison which have been researched in PE include physical activity, PE grade (Trautwein et al., 2008), engagement and disaffection (Barnes & Spray, 2013). Trautwein et al. (2008) found that students who were members of a class with a high average ability reported lower levels of physical activity and PSC, but higher grades. Furthermore, Barnes and Spray (2013) found that students who indicated believing that he/she was highly able within the class experienced higher levels of engagement and lower levels of disaffection. From this small number of studies, it is clear that relationships between different frames of reference and outcomes are varied and that research investigating multiple frames of reference and other important educational outcomes is warranted. Self-efficacy and positive and negative affect (well-being) are three such variables which may be related to social comparison.

Self-efficacy is defined as the confidence in one's ability that successful execution of a required behavior is achievable, which in turn will lead to a desired outcome (Bandura, 1977). Self-efficacy is considered an important educational consequence (Zimmerman, 2000) which has been associated in the school context with social comparison (Chase, 1998) and also demonstrated to link with levels of physical activity (Trost et al., 2001). Chase (1998) qualitatively investigated the sources of self-efficacy in PE and sport, suggesting that comparison with others was the third most frequently cited source of self-efficacy information.

Affective outcomes of social comparison have received less attention than cognitive and behavioural outcomes; however, there are a few studies from which we can draw upon when looking at this as part of the comparison process (Buunk et al., 2005; Vrugt, 1994). The research by Buunk et al. (2005) and Vrugt (1994) has concentrated on academic subjects and 'discrete' emotions arising from comparisons, however, it may be that comparisons result in a general feeling of affect rather than specific emotions. Given the small number of studies investigating affect in relation to social comparison, a more generalised approach towards affect was taken for this study and, consequently, positive and negative affect were chosen as indicators of affective reactions.

Exploring social comparison under the lens of self-determination theory

Integrating theories to further knowledge and understanding of different concepts and the causality of relationships is a task which researchers have begun to, and must continue to, undertake (Abós et al., 2018; Spray et al., 2006). The Self-Determination Theory (SDT; Deci & Ryan, 2000) has provided insight into adolescents' behavior in physical education (e.g., Sánchez-Oliva et al., 2014), and links with social comparison. SDT proposes that individuals possess three psychological needs; autonomy, competence, and relatedness.¹ Satisfaction of these basic needs facilitates self-determined motivation in the context of relevance. SDT also proposes that there are six forms of behavioural

¹ Autonomy is defined as an individual's desire to direct one's own behaviour and to experience concordance between an activity and one's integrated sense of self. Relatedness refers to the need to feel connected with others, whereas competence refers to the desire to attain given outcomes and to feel that one's efforts are effective (Deci & Ryan, 2000).

(motivational) regulation. These regulations lie on a continuum from highly self-determined (intrinsic) to various forms of extrinsic motivation (integrated, identified, introjected) to amotivation (Deci & Ryan, 2000; Markland & Tobin, 2004). Research investigating SDT in physical education (Taylor et al., 2010) has aligned with SDT tenets, with children who experience higher levels of autonomy, competence and relatedness tending to be more engaged, showing higher levels of effort and spending more time in leisure time physical activity. The picture regarding behavioural regulations is slightly more complex, with for example, individuals high in identified regulation putting in more effort than those who are intrinsically motivated (Taylor et al., 2010). Given the importance of behavioural regulations, and social comparison findings that link to important educational outcomes (Barnes & Spray, 2013), it seems logical to suggest that social comparison theory may tie in with SDT and help explain variance in outcomes such as positive affect and self-perceptions. Previous studies have identified the effects that motivational regulations, explored from an SDT perspective, have on specific academic outcomes (Vasconcellos et al., 2020). Given these associations between motivation and educational outcomes, it seems plausible to hypothesize that behavioural regulations could moderate the relationships between social comparisons and educational outcomes in PE (self-efficacy, positive and negative affect, PSC).

Aims of the present investigation

The aims of the present study were three-fold. First, the study examined the role that comparisons with two frames of reference (perceptions of ability in comparison to the class -PRSC, or perceptions of ability in comparison to the individual -PRSI), played in predicting PSC, self-efficacy, positive and negative affect. Second, we examined the main effects of three motives for comparison (self-improvement, self-enhancement, and self-evaluation) on the four dependent variables, and if these motives moderated the expected relationships between social comparisons and the dependent variables. Third, we sought to integrate SDT and social comparison perspectives by examining the moderating role of behavioural regulations on the relationships between comparisons and young people's outcomes.

Methods

Participants

Four hundred and ninety-one adolescents (209 = males, 273 = females, 9 = undisclosed; $M_{age} = 14.75$, $SD = 0.90$ years) nested within 28 PE classes, taught by nine different teachers, in Years 9, 10 and 11 from one school in England completed a multi-section inventory. The proportion of children eligible for free school meals was below average, indicating higher socioeconomic status of the pupils attending the school. 89% of the sample classified themselves as white, 3.3% as Asian, 1.7% as black, 4.4% indicated identifying with another ethnicity and 1.7% did not disclose their ethnicity.

Measures

Personal information

Adolescents were asked to indicate their school's name, year group, PE teacher, gender, age and ethnic group.

Comparative evaluations

In order to measure children's PRSC, the single item by Huguet et al. (2001) was adapted for PE. Specifically, given the limitations of single-item measures, participants were asked to respond to four items gaging their relative competence in their PE class. e.g., 'Considering most of the pupils in my PE class, I think I am ...'. It was indicated that these items could be left blank if participants were unsure of the answer.

To ascertain if the participant compared with an individual in the

class, the questionnaire then asked the student to identify one person in their class with whom they typically compared. The word compare was defined for the participants as 'someone who you may look for similarities and differences with whilst doing an activity'. Children were given the option to leave this question blank and to move on if they did not compare with an individual. To measure PRSI, participants were then asked to respond to the following item, adapted from Huguet et al.'s (2001) comparative evaluation item used to measure standing relative to the named individual: 'How good do you feel you are in comparison to the person you named in question x?' Responses to both questions were provided on a five-point Likert-type scale where 1 signified much worse, 3 the same and 5 much better.

Motives for comparison

The motives to engage in social comparison, self-improvement, self-enhancement, and self-evaluation, were assessed based on the work of Wood et al. (2000) and Helgeson and Mickelson (1995). Specifically, given the limitations of single-item measures, together with the paucity of research into children's reasons for making social comparisons in PE, three items were created by the authors for each motive. Participants were informed that 'People compare with many different students in PE, those who might be better than them, those who they might feel are the same ability and those who aren't as good as them.' Participants responded to nine items in total: e.g., 'so I can get better' (self-improvement); 'to make myself feel better' (self-enhancement); and 'to see how I'm doing' (self-evaluation). Participants indicated how likely they were to compare with others in PE for each reason on a five-point Likert-type scale where 1 signified extremely unlikely and 5 extremely likely.

Motivational regulations

The revised perceived locus of causality in physical education (PLOC-R) was utilised to assess the behavioural regulations which underlie children's participation in PE (Vlachopoulos et al., 2011). This scale has been adapted from Goudas et al. (1994) perceived locus of causality scale and has demonstrated acceptable validity. The PLOC-R is formed by five dimensions: intrinsic motivation, identified regulation, introjected regulation, external regulation and amotivation. For the purpose of the current study, we computed composite scores for autonomous and controlled motivation. Autonomous motivation consisted of items representing 'intrinsic motivation' and 'identified regulation'. Controlled motivation consisted of items for 'introjected' and 'external regulation'. Previous studies have successfully assessed these constructs (autonomous and controlled motivation) by considering the more specific regulations displayed in the PLOC (Franco et al., 2021; Van den Berghe et al., 2014). The initial stem was 'I participate in PE....' and different reasons were provided through items reflecting intrinsic motivation (e.g., 'because PE is fun'), identified regulation (e.g., 'because it is important to me to try hard in PE'), introjected regulation (e.g., 'because it would bother me if I didn't'), external regulation (e.g., 'because that's the rule'), and amotivation (e.g., 'but I don't really know why'). Responses were given on a seven-point Likert-type scale from 1 (totally disagree) to 7 (totally agree).

Physical self-concept

To measure adolescents' physical self-perceptions, the global physical self-worth scale from the short version of the Physical Self-Description Questionnaire (Marsh et al., 2010) was used composed by three items (e.g., 'Physically, I am happy with myself'). Participants responded using a Likert type scale from 1 (false) to 6 (true). This scale has shown adequate reliability and factorial validity in adolescent samples (Marsh et al., 2010).

Self-efficacy

In order to assess participants' self-efficacy, Jackson et al.'s (2012) nine-item measure was used which followed the stem 'please honestly

rate your confidence in your ability at this moment in time to...' (e.g., 'try your hardest in every PE class'). These items have shown good factorial structure and validity (Jackson et al., 2012). Participants responded on a five-point scale from 1 (no confidence at all) to 5 (complete confidence).

Positive and negative affect

In order to assess affect, the Positive and Negative Affect Scale (PANAS; Watson et al., 1988) was employed. Watson et al. (1988) developed 20-items, with ten items addressing positive affect (e.g., excited) and ten for negative affect (e.g. upset). Participants were required to indicate how they had felt generally over the past few weeks in their PE lessons. Responses were provided on a five-point scale from 1 (very slightly) to 5 (extremely). The PANAS has demonstrated good internal reliability for both positive and negative affect along with acceptable factorial validity.

Procedure

Following ethical approval, a pilot study was carried out to assess the appropriateness of language and length of questionnaire before it was used in the school. Parental consent was given for children who took part in the pilot study. Children were asked to feedback their comments and thoughts on the questionnaire. Following the pilot study ($n = 12$), the revised questionnaire was then edited and distributed at the participating school.

The Headteacher, PE teachers and parents of participants were contacted before the questionnaire was circulated to students. Once parental consent was gained, participants completed the questionnaire during their normal PE lessons. An explanation was given to children on how to fill in the questionnaire and they were then given a chance to ask questions. In addition, the participants were informed that they could ask questions at any point whilst they were completing the questionnaire if they did not understand anything. Student assent was obtained by each participant signing a willingness to participate form before completion of the questionnaire. All participants were reassured that their PE teachers would not be able to access their answers and that their responses were anonymous. Each participant completed a multi-section questionnaire in approximately 20 to 30 min.

Data analysis

To test the factor structure of PRSC (single factor) and the motives for comparison (three factors) scales, two confirmatory factor analyses were carried out. Four fit indices were used to assess the factor structure: comparative fit index (CFI); the Bentler-Bonett non-normed fit index (NNFI); the standardized root mean square residual (SRMR); and the root mean square error of approximation (RMSEA). Hu and Bentler (1999) proposed the following fit indices as acceptable: CFI > 0.95; SRMR < 0.06; NNFI > 0.95; RMSEA < 0.08. The three motives were entered into one model simultaneously with a separate model run for PRSC. Secondly, descriptive statistics were performed for all the variables in the study, and internal reliability was checked by assessing Cronbach's alpha for multi-item scales. Multi-level regression analyses were then performed to assess the associations between the frames of reference, the motives for comparison and the motivational regulations with PSC, self-efficacy, and positive and negative affect. All variables were standardised before the regressions were run. All interaction terms (product term) were left un-standardised (Aiken & West, 1991). standardization was carried out to prevent multi-collinearity between predictors when interactions were entered into the analyses. Analysis was carried out using MLwiN (2.25). All predictor variables were fixed to attain model convergence. All interaction terms were entered simultaneously. Non-significant interactions were then removed and the model re-run. The process of removal was methodical with the least significant removed each time. Once significant interactions were identified, only

when the change in deviance was significant were the interactions retained in the models.

Results

Preliminary analysis

The model run for class level comparative evaluations (PSRC) demonstrated good fit: Satorra-Bentler $\chi^2(2) = 5.49, p = .064$; CFI = 0.995; NNFI = 0.986, SRMR = 0.013; RMSEA = 0.062 (CI = 0.00–0.13). The models for motives for comparison were run twice, once as a one-factor model and a second time as a three correlated factor model (each motive represented by three items). The three factor model demonstrated a significantly better fit than the single factor model: Satorra-Bentler $\chi^2(24) = 67.14, p < .001$; CFI = 0.97, NNFI = 0.95, SRMR = 0.04, RMSEA = 0.08 (CI = 0.06–0.09).

Descriptive statistics and scale reliabilities

Table 1 presents the inter-correlations, means, standard deviations and Cronbach's alphas for the study variables. External regulation showed poor internal reliability ($\alpha = 0.46$) and was, therefore, removed from any further analyses. Introjected regulation showed reasonable internal reliability ($\alpha = 0.69$) and was therefore used as the controlled behavioural regulation predictor. All other multi-item scales showed good internal reliability ($\alpha > 0.70$). 72.4% of participants indicated that they compared with an individual in their PE class.

Multi-level regression analyses

In order to establish class level-variance for each variable, intra-class correlations (ICCs) were calculated. ICCs for the dependent variables were of 0.02 for PSC; 0.02 for self-efficacy; 0.05 for positive affect; 0.01 for negative affect. Following this, three models were run for each dependent variable. The first model examined comparative evaluations, the second, social comparison motives and the third, behavioural regulations.

The role of frames of reference for comparative evaluations

As shown in Table 2, PRSC positively predicted PSC [$\beta = 0.52$ (0.04), $p < .05$], self-efficacy [$\beta = 0.52$ (0.04), $p < .05$] and positive affect, [$\beta = 0.48$ (0.04), $p < .05$] and was negatively associated with negative affect [$\beta = -0.32$ (0.05), $p < .05$]. There were no main effects of PRSI on any of the dependent variables [$\beta_{\text{PSC}} = 0.03$ (0.04), $p > .05$; $\beta_{\text{Self-efficacy}} = -0.04$ (0.04), $p > .05$; $\beta_{\text{Positive affect}} = -0.03$ (0.04), $p > .05$; $\beta_{\text{Negative affect}} = 0.05$ (0.05), $p > .05$]. An interaction between PRSC and PRSI on positive affect was found [$\beta = -0.09$ (0.04), $p < .05$]. This interaction showed that positive affect was highest when PRSC was high and PRSI was low (see Fig. 1).

The role of motives

Findings regarding the effects of motives for comparison are displayed in Table 3. No main effects of motives on PSC [$\beta_{\text{Self-evaluation}} = 0.03$ (0.06), $p > .05$; $\beta_{\text{Self-improvement}} = 0.04$ (0.05), $p > .05$; $\beta_{\text{Self-enhancement}} = 0.01$ (0.05), $p > .05$] or negative affect [$\beta_{\text{Self-evaluation}} = -0.12$ (0.07), $p > .05$; $\beta_{\text{Self-improvement}} = -0.04$ (0.06), $p > .05$; $\beta_{\text{Self-enhancement}} = 0.08$ (0.06), $p > .05$] were identified. Self-efficacy was positively predicted by self-evaluation [$\beta = 0.25$ (0.04), $p < .05$] and self-improvement [$\beta = 0.16$ (0.05), $p < .05$], whilst positive affect was also positively predicted by self-evaluation, [$\beta = 0.28$ (0.05), $p < .05$] and self-improvement [$\beta = 0.27$ (0.05), $p < .05$]. A significant negative interaction between PRSI and self-improvement was also identified [$\beta = -0.09$ (0.03), $p < .05$] for positive affect. This interaction showed that when PRSI was low and self-improvement was high, that highest levels

Table 1
Descriptive statistics, intercorrelations and alpha coefficients for all variables.

	1	2	3	4	5	6	7	8	9	10	11	M	SD	α
1 PRSC	–											3.26	.86	.91
2 PRSI	.13**	–										4.07	1.53	
3 Motive to improve	.19**	–0.03	–									3.29	.90	.70
4 Motive to enhance	.26**	–0.03	.44**	–								3.17	1.05	.82
5 Motive to evaluate	.26**	.00	.64**	.53**	–							3.46	.92	.79
6 Autonomous	.43**	–0.01	.55**	.41**	.57**	–						4.45	1.51	
7 Controlled	.02	–0.04	.23**	.25**	.19**	.18**	–					2.75	1.31	.69
8 Amotivation	–0.29**	–0.02	–0.27**	–0.19**	–0.30**	–0.61**	.12*	–				2.44	1.41	.80
9 Physical self-concept	.51**	.09	.16**	.16**	.18**	.25**	–0.17**	–0.20**	–			3.94	1.35	.93
10 Self-efficacy	.52**	.04	.41**	.33**	.47**	.67**	.09	–0.45**	.42**	–		3.65	.75	.88
11 Positive affect	.46**	.03	.52**	.32**	.53**	.73**	.08	–0.53**	.30**	.72**	–	3.28	.85	.88
12 Negative affect	–0.30**	.02	–0.15**	–0.06	–0.18**	.25**	.21**	.29**	–0.27**	–0.31**	–0.30**	1.48	.60	.84

Note. PRSC=perceived relative standing in class; PRSI=perceived relative standing compared to a chosen individual. Response scales ranged from 1 to 5 for PRSC, PRSI, self-efficacy, positive/negative affect; 1–6 for physical self-concept; 1–7 for motivational regulations. *** $p < .001$.

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

Table 2
Multi-level model analyses – social comparison effects (model 1).

	PSC	Self-efficacy	Positive Affect	Negative Affect
Model 1	–0.01	–0.03	–0.02 (0.07)	.02 (0.05)
intercept	(0.05)	(0.05)	.48 (0.04)*	–0.32 (0.05)*
PRSC	.52 (0.04)*	.52 (0.04)*	–0.03 (0.04)	.05 (0.05)
PRSI	.03 (0.04)	–0.04	–0.09 (0.04)	–0.01 (0.04)
PRSC x PRSI	.04 (0.04)	(0.04)	*	1209.32
Deviance	1136.74	–0.06	1135.29	
		(0.04)		
		1096.64		

Note. PRSC=perceived relative standing in class; PRSI=perceived relative standing compared to a chosen individual.

* $p < .05$.

of positive affect were indicated (see Fig. 2).

The role of motivational regulations

Table 4 presents the findings on the effects of motivation on the dependent variables. Autonomous motivation positively predicted both self-efficacy [$\beta = 0.52 (0.05), p < .05$] and positive affect [$\beta = 0.54 (0.05), p < .05$], whilst no main effects for PSC [$\beta = -0.06 (0.06), p >$

.05] and negative affect [$\beta = -0.10 (0.06), p > .05$] were found. Controlled regulation negatively predicted PSC [$(\beta = -0.17 (0.04), p < .05)$] and positively predicted negative affect [$\beta = 0.21 (0.04), p < .05$] with no main effects for self-efficacy [$\beta = -0.01 (0.03), p > .05$] or positive affect [$\beta = -0.01 (0.03), p > .05$]. Amotivation was negatively associated with both self-efficacy [$\beta = -0.08 (0.04), p < .05$] and positive affect [$\beta = -0.17 (0.04), p < .05$], positively associated with negative affect [$\beta = 0.18 (0.06), p < .05$], with no main effect identified for PSC [$\beta = -0.05 (0.06), p > .05$]. Furthermore, two significant interactions were identified. The relationship between PRSC and PSC was moderated by autonomous motivation [$\beta = 0.09 (0.04), p < .05$], where PSC was highest amongst participants who were high in both PRSC and autonomous motivation (see Fig. 3). The second interaction was between PRSC and controlled motivation on negative affect [$\beta = -0.16 (0.04), p < .05$], where negative affect was highest amongst students who were low in PRSC and high in controlled motivation (see Fig. 4).

Discussion

The aims of the present study were three-fold. First, the study examined the role that comparisons with two frames of reference (PRSC and PRSI), played in predicting PSC, self-efficacy, positive and negative affect. Second, this study sought to examine the main effects of three motives for comparison (self-improvement, self-enhancement, and self-

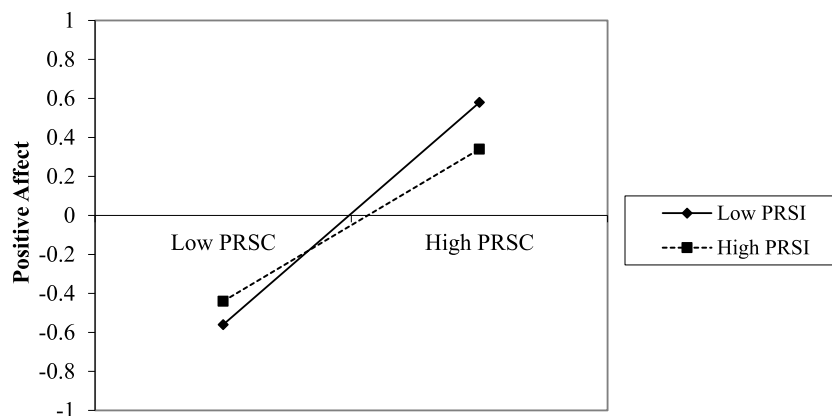


Fig. 1. Regression Slopes ($\pm 1SD$) Depicting Interaction Between PRSC and PRSI on Positive Affect.
Note. PRSC=perceived relative standing in class; PRSI=perceived relative standing compared to a chosen individual.

Table 3
Multi-level model analyses – motive effects (model 2).

	PSC	Self-Efficacy	Positive Affect	Negative Affect
Model 2 intercept	.00 (0.05)	−0.02 (0.05)	−0.03 (0.06)	.01 (0.05)
PRSC	.50 (0.04)*	.43 (0.04)*	.35 (0.04)*	−0.29 (0.05)*
PRSI	.02 (0.04)	−0.01 (0.05)	.00 (0.05)	.05 (0.05)
Self-evaluation	.03 (0.06)	.25 (0.04)*	.28 (0.05)*	−0.12 (0.07)
Self-improvement	.04 (0.05)	.16 (0.05)*	.27 (0.05)*	−0.04 (0.06)
Self-enhancement	.01 (0.05)	.03 (0.05)	.01 (0.04)	.08 (0.06)
PRSI X Self-improvement	.	.	−0.09 (0.03)*	.
Deviance	1108.43	992.15	958.75	1175.55

Note. PRSC=perceived relative standing in class; PRSI=perceived relative standing compared to a chosen individual.

* $p < .05$.

evaluation) on the four dependent variables, and if these motives moderated the expected relationships between social comparisons and the dependent variables. Third, this study aimed to integrate SDT (Deci & Ryan, 2000) and social comparison (Festinger, 1954) frameworks by assessing adolescents’ motivational regulations and examining if these interacted with comparisons to influence outcomes.

Frames of reference

Previous research (Barnes & Spray, 2013; Chanal & Sarrazin, 2007) has demonstrated that investigating multiple frames of reference is essential if researchers are to progress knowledge and understanding of comparison processes. Furthermore, Locke (2007) demonstrated that group perceptions were more influential than comparison with an individual, whereas Buckingham and Alicke (2002) identified that comparisons with an individual could moderate outcomes of comparing with a generalised other. In the present study, the generalised other, measured using PRSC, independently accounted for variance in the dependent variables. In contrast, PRSI showed no main effects. There was, however, one interaction between perceived relative standing in class and perceived relative standing compared to an individual for positive affect, where positive affect was highest when perceived relative standing in class was high and perceived relative standing compared to an individual was low. This finding indicates that individuals who are relatively able within the class, but are not as able as a chosen individual experience higher levels of positive affect than those who are high in both perceived relative standing in class and perceived relative standing compared to an individual. This links to previous research (Barnes &

Spray, 2013) which found a similar relationship for disaffection, where individuals who were highest in both PRSC and PRSI seemed to begin to disengage in the lesson. These results may indicate that children who compare and believe that they are the best in comparison to multiple frames of reference may lose interest and experience lower levels of positive affect and increased boredom in situations in which they are told to compete against others. However, this might not be the case in lessons in which self-referred aims are set and thus can still optimally challenge those students with the highest PRSC and PRSI.

Motives for comparison

This study extends previous research (Barnes & Spray, 2013; Butler, 1992; Lubbers et al., 2009) by providing evidence that self-evaluation and self-improvement motives lead to adaptive outcomes, whereas self-enhancement does not directly relate to any of the outcomes under investigation. Furthermore, the lack of evidence for direct relationships between motives and physical self-concept and negative affect could suggest that there are other motives such as proximity which influence variables such as these, or that these are not explained by motives for comparison.

In addition to these main effects, this study extends previous research by providing evidence of a negative interaction between PRSC and self-improvement where highest levels of positive affect were found when

Table 4
Multi-level model analyses – motivational regulation effects (model 3).

	PSC	Self-efficacy	Positive Affect	Negative Affect
Model 3 intercept	−0.06 (0.05)	−0.01 (0.04)	.01 (0.04)	−0.03 (0.05)
PRSC	.49 (0.05)*	.29 (0.04)*	.20 (0.04)*	−0.19 (0.05)*
PRSI	.03 (0.04)	−0.01 (0.03)	−0.01 (0.03)	.03 (0.04)
Autonomous	.06 (0.06)	.52 (0.05)*	.54 (0.05)*	−0.10 (0.06)
Controlled	−0.17 (0.04)*	−0.03 (0.04)	−0.01 (0.03)	.21 (0.05)*
Amotivation	−0.05 (0.06)	−0.08 (0.04)*	−0.17 (0.04)*	.18 (0.06)*
PRSC X Autonomous	.09 (0.04)*	.	.	.
PRSC X Controlled	.	.	.	−0.16 (0.04)*
Deviance	1030.190	836.589	790.337	1034.918

Note. PRSC=perceived relative standing in class; PRSI=perceived relative standing compared to a chosen individual.

* $p < .05$.

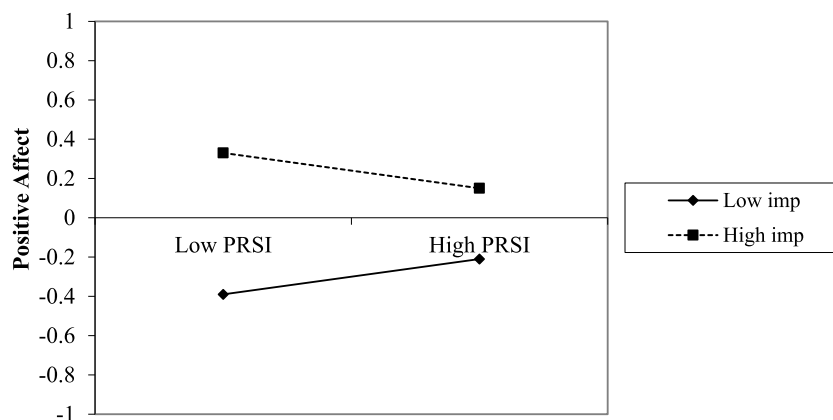


Fig. 2. Regression Slopes (± 1SD) Depicting Interaction between PRSI and Self-improvement on Positive Affect
Note. PRSI=perceived relative standing compared to a chosen individual; imp = self-improvement.

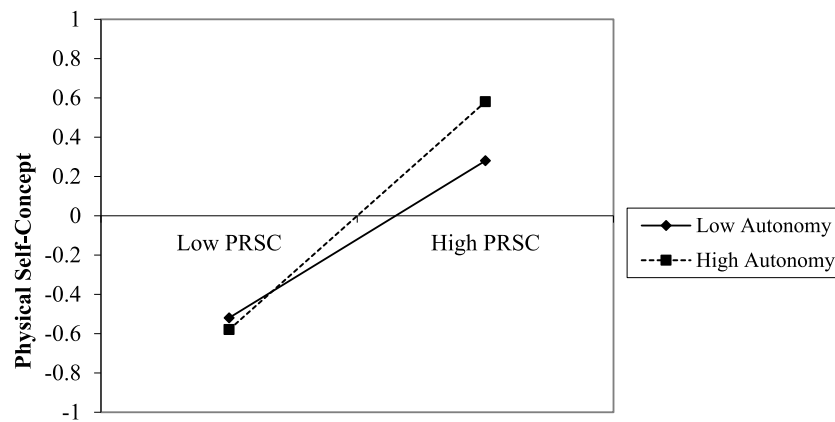


Fig. 3. Regression Slopes (\pm 1SD) Depicting Interaction between PRSC and Autonomous Motivation on PSC
 Note. PRSC=perceived relative standing in class.

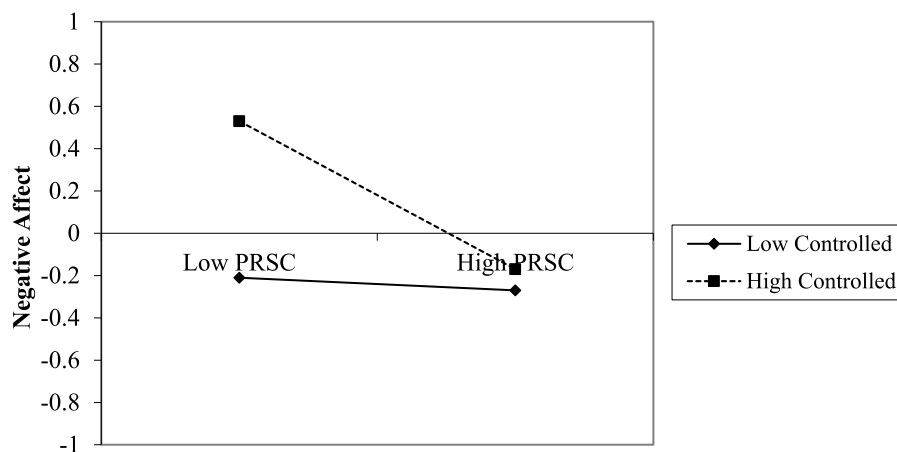


Fig. 4. Regression Slopes (\pm 1SD) Depicting Interaction between PRSC and Controlled Motivation on Negative Affect
 Note. PRSC=perceived relative standing in class.

PRSC was low and self-improvement was high. This interaction suggests that when a comparative other is seen as more able and the comparer is motivated to improve, that this evokes a positive response from the comparer. We suggest that this could be due to the comparer seeing the higher performer as a target or goal and providing inspiration for improvement in ability. Furthermore, when both PRSI and self-improvement were low, lowest levels of positive affect were seen. It seems, therefore, that encouraging students who are low in PRSI to compare for reasons of improvement may be beneficial to their levels of positive affect. This interaction was found when there was no main effect of PRSI on positive affect. It seems, therefore, that motives may serve to directly influence outcomes, but these effects do not (with the exception of improvement and PRSI) moderate the effects of comparative evaluations on the outcomes investigated in this study.

Motivational regulations

The third purpose of this study was to combine SDT (Deci & Ryan, 2000) and social comparison (Festinger, 1954) perspectives in order to examine the moderating role of behavioural regulations on the relationships between social comparisons and four important educational outcomes. The study focused on whether adolescent's behavioural regulations (perceived locus of causality) moderated the relationships between comparisons with two frames of reference and the dependent variables. Relationships between the behavioural regulations and the dependent variables varied, with two interactions identified.

Results provide evidence for the importance of both social

comparisons and behavioural regulations in predicting important educational outcomes. Furthermore, the two interactions highlight how social comparisons and behavioural regulation jointly influence certain outcomes. Specifically, physical self-concept was highest when both PRSC and autonomy were high whereas negative affect was highest when PRSC was low and controlled regulation was high. The interaction between PRSC and autonomy demonstrates that even autonomy has no direct effect on physical self-concept that it does play a role in moderating the relationship between PRSC and PSC.

The second interaction between PRSC and controlled motivation showed that there was no difference in levels of negative affect experienced at either level of PRSC when controlled motivation was low, whereas negative affect was highest when PRSC was low and controlled regulation was high. These interactions extend previous research by demonstrating how the integration of theories can help to explain variance in dependent variables and assist us in untangling the complex relationships that exist and influence adolescent's experiences and well-being/feelings in PE.

Limitations and future directions

The current study has limitations which must be acknowledged. The first is its cross-sectional design and, therefore, causality cannot be assumed. In addition, it must be accepted that relationships will be reciprocal and could, therefore, be interpreted in the opposite direction. It is proposed, however, that the relationships are in the direction stated particularly given previous longitudinal research (Chanal et al.,

2005) which has demonstrated the direction of the relationship between perceived ability in class and physical self-concept over time. Given that this is only the second examination of comparative evaluations and the self-efficacy and positive and negative affect, there is a need for future research to investigate these relationships longitudinally.

Second, the items used to assess external regulation demonstrated weak reliability and in-depth analysis of specific behavioural regulations was limited. The reliability for introjected regulation was also slightly lower than 0.70 and these reliability issues need to be addressed in future research so that an in-depth analysis of how comparative evaluations and behavioural regulations interact to inform various outcomes. Third, it is worth mentioning that PRSI was measured using a single-item scale, which could have affected the validity of the measure. Adapted items were utilised for different scales. Although these items showed good internal reliability, they should be further validated for use within PE. Adapting items from sport can work as demonstrated in this study, but items specifically for PE are desirable, particularly given the importance of PE in predicting long term physical activity outcomes. Fourth, the study employed only self-report measures which may have led to inflated relationships due to shared method variance. Future research would benefit from including teacher or parental reports to supplement self-report measures. Moreover, there was no control for objective ability.

Notwithstanding these limitations, the present study represents a rare investigation into social comparison processes in PE. Not only has this study investigated new dependent variables, but it has also provided evidence for the factor structure and reliability for multi-item scales for PRSC and motives for comparison which other researchers can use in the future. Furthermore, we have begun to draw upon other theories to help extend knowledge concerning social comparison, but we are still far from gaining insight into how these complex social comparison processes influence individuals.

In addition, this study sought to bring SDT and social comparison together in order to assess if this can enhance our understanding of the dependent variables in question. Research which continues to integrate theories in order to explain variance in outcome variables is essential if we are to understand how positive affect, for example, is influenced by an array of factors. Moreover, future research investigating other moderators and class level variables is warranted as these may help to explain and further our understanding of both the direct and indirect relationships between social comparisons, motives, and important educational outcomes. Lastly, focusing on whether particular PE tasks and activities increase the prevalence or impact of social comparisons would provide useful information for teachers regarding which practices or activities (e.g., hockey or swimming) provide more optimal outcomes for young people in PE.

In conclusion, this study provides insight into adolescents' social comparisons, their motives for comparison, and individual moderators of comparisons on young people's outcomes in PE. It suggests that social comparisons are engaged in and driven by multiple motives in adolescents and highlights the direct effects of social comparisons on four important educational outcomes, utilizing two frames of reference. It also sheds light on the moderator role that motives for comparison and motivational regulations play in the association between social comparison and key consequences, thus providing evidence from a naturalistic setting of the complexity of social comparison processes on young people's experiences in PE.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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