Autonomy–Mastery Supportive or Performance Focused? Different teacher behaviours and pupils’ outcomes in physical education

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We investigated the role of motivational climates, teacher autonomy support, perceived competence and autonomy on pupils’ self-regulated motivation in physical education (PE) classes of Norwegian 10th-graders. Path analyses revealed that a mastery climate and teacher autonomy support both (a) positively influenced intrinsically regulated motivation as measured by the relative autonomy index (RAI) and by the intrinsic motivation subdimension, and (b) negatively influenced amotivation. Perceived competence, but not perceived autonomy, significantly and partially mediated these relationships. Unmediated by perceived competence, a performance climate was found to facilitate amotivation. A mastery climate, autonomy support, perceived competence and intrinsically regulated motivation predicted enhanced levels of interest/enjoyment in PE. Intrinsically regulated motivation and perceived competence predicted after-school physical activity. Findings suggest that blending achievement goal theory and self-determination theory add to our understanding of motivational, affective and behavioural outcomes in school physical education.

Keywords: Autonomy support; Self-regulation of motivation in PE

Introduction

Recently, the role attached to school physical education (PE) in preparing children for lifetime physical activity interest has been heavily debated (O’Sullivan, 2004), and PE has been ascribed added potential in contributing to public health goals of increased physical activity among young people, provided there is implementation of well-functioning curricular programmes that enhance satisfaction and interest (Trost, 2004; Vilhjalmssson & Thorlindsson, 1998). There is, however, increasing evidence showing that young people’s physical activity has decreased over the years.

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and pupils’ interest in PE is reduced through adolescence (Sallis, Prochaska, & Taylor, 2000; Van Wersch, Trew, & Turner, 1992). Further, young people’s decisions about after-school physical activity seem heavily influenced by past experiences in PE, such that a sense of boredom, lack of choice, incompetence and negative peer evaluation negatively influence pupils’ motivation to participate in sports outside PE (Coakley & White, 1992). With this in mind, it seems important to identify factors in PE that may positively influence pupils’ motivation and enjoyment in PE and to examine the role of social-contextual and psychological factors in PE on pupils’ physical activity outside the PE domain.

Two widely used theories to analyse pupils’ motivation in school physical education and leisure-time sports have been the achievement goal approach (Nicholls, 1989) and self-determination theory (Deci & Ryan, 1985; Ryan & Deci, 2000). These theories have facilitated our understanding of motivated behaviour and related cognitive, affective and behavioural outcomes in physical education and sport (Duda, 2001; Gagne, Ryan, & Bargman, 2003; Vallerand & Losier, 1999).

Characteristic of previous studies has been an examination of pupils’ motivation using only one of these models at a time (Ntoumanis, 2001a; Ommundsen, 2001a, 2001b, 2003; Pusak, Treasure, Darst, & Pangazi, 2004; Standage, Duda, & Ntoumanis, 2005). Nevertheless, recent research in the PE domain has made use of previous empirical links found between achievement goal theory and self-determination theory (e.g., Goudas & Biddle, 1994; Goudas, Biddle, & Fox, 1994; Ntoumanis, 2001b) to study relations of motivational climate, achievement goals and perceived competence derived from achievement goal theory to motivational regulations derived from self-determination theory (e.g., Standage, Duda, & Ntoumanis, 2003). Standage and coworkers found a task orientation, perceived competence and perceptions of a mastery climate to be predictive of intrinsically regulated or self-determined motivation among physical education students. Clearly, the study by Standage and coworkers as well as previous studies (e.g., Goudas & Biddle, 1994; Goudas et al., 1994; Ntoumanis, 2001b), and others in the sport domain (e.g, Sarrazin, Vallerand, Guillet, Pelletier, & Cury, 2002), have added to our understanding of the complementary role of factors derived from different theoretical positions to understand pupils’ cognitive, affective and behavioural responses in PE and sport.

There is, however, a need for studies to test the role of social-contextual factors derived from both theoretical positions as precursors of pupils’ intrinsically regulated motivation, interest/enjoyment in PE and self-reports of after-school physical activity. In particular, the potential role of mediating factors in the examination of these relationships has only received scant attention (e.g. Ferrer-Caja & Weiss, 2000; Ntoumanis, 2001b). Hence, the main purpose of the present study was, first, in line with the sequential pattern of relationships hypothesised to underlie human motivation, proposed by Vallerand and Losier (Vallerand, 1997; Vallerand & Losier, 1999), to examine the role of perceived autonomy support and motivational climates for pupils’ variations in self-determined forms of self-regulation of their motivation as well as amotivation in PE. Secondly, we examined psychological factors derived from the two theoretical perspectives as mediating influences in these relationships. Thirdly, we examined interest/enjoyment in PE and participation in after-school physical activity as affective and behavioural consequences, respectively.

Self-regulation of Motivation and Interest/Enjoyment

Contemporary postulates of self-determination theory (Deci & Ryan, 1991; Ryan & Deci, 2000) identify three forms of motivational self-regulation, namely intrinsic motivation, extrinsic motivation and amotivation. Situated on a continuum ranging from lower to higher levels of self-determination, extrinsic motivation embraces external, introjected and identified regulations. External regulations represent non-autonomous behaviours that are dictated by externally controlled factors (e.g., rewards or threats), whereas introjected regulation refers to compliance-oriented and guilt-controlled actions that are performed by pupils when they feel that they should take part in PE. Identified regulation represents a stage at which pupils partake in PE because they accept participation as important to themselves. The least self-determined motivation is amotivation, which stems from feelings of incompetence, lack of activity value and the belief that one’s actions have little, if any bearing on outcomes (Ryan & Deci, 2000). A state of amotivation is presumed to signal lack of interest in investing in PE. Defined as doing an activity for its inherent satisfaction, as opposed to separable consequences, intrinsic motivation represents the most self-determined motivation.

Interest/enjoyment, in contrast, is usually approached in a one-dimensional fashion (Crocker, Hoar, McDonough, Kowalski, & Niefer, 2004; Duda & Nicholls, 1992; Scanlan, Simons, Carpenter, Schmidt, & Keeler, 1993; Williams & Deci, 1996). Interest/enjoyment is more differentiated than global positive affect and includes pleasure, liking and fun, but is more global than specific emotions like happiness and joy (Jackson, 2000; Scanlan & Simons, 1992).

Contextual Influences in PE: The role of perceived motivational climates and teacher autonomy support

Derived from achievement goal theory and self-determination theory of motivation, contextual influences such as motivational climates refer to affective and social conditions in the learning environment, with reference to interpersonal processes and evaluation (Ames, 1992; Grohnick, Deci, & Ryan, 1997; Nicholls, 1989). Such contextual or perceived situational motivational conditions are critical in educational settings, in that the belief systems pupils construct due to such influences have important implications for the way they interpret and emotionally respond in achievement settings (Gopnik & Wellman, 1994; Medin, 1989). Further, intrinsic motivation and positive affect are prerequisites for effort and persistence and sustained participation in physical activities and sport.
In PE contexts, PE teachers' behaviour can have a crucial impact on pupils' ability beliefs, self-regulation of their motivation and their affective states in the way teachers design lessons, group pupils, give recognition, evaluate performance, share their authority and shape the PE setting. In summary, they establish a motivational climate. Hence, pupils' perceptions of the motivational climate in PE may influence the way they approach achievement tasks. Doing the tasks and evaluating their performance on the tasks in turn plays a role in their quality of motivation and affective responses (Ames, 1992; Dweck, 1991; Gagne et al., 2003; Ryan & Grolnick, 1986; Ommundsen, 2001b).

According to the achievement goal approach, a mastery climate is fostered by the teachers' focus on learning, self-improvement and participation behaviour such as optimally challenging tasks and effort. A task-oriented motivational climate seems to be characterised by teachers who emphasise effort and progress in their feedback to the students, and they are satisfied when the students learn new skills, improve and cooperate to learn. Secondly, in a task-oriented climate, the PE teacher also emphasises that making mistakes is an integral part of learning (Ames, 1992; Papsioannou, 1995). Thirdly, a task-oriented motivational climate is also facilitated by presenting a variety of activities and tasks that are optimally challenging for students with differences in their abilities. In contrast, a performance climate has its focus on social comparison rewards, normative ability and the more able students. Further, a performance climate is promoted by the teacher's emphasis on interpersonal competition, public evaluation and normative feedback. In a performance climate, mistakes are punished, reinforcement and attention are differentially provided as a function of ability, and there may be rivalry among pupils in the class (Ames, 1992; Nicholls, 1989).

According to cognitive evaluation theory, which is integrated in the broader self-determination theory, social or contextual influences impact on pupils' intrinsically regulated motivation and positive affect through the satisfaction of their need to be competent and autonomous. Information and influence from the social environment can be characterised as either pressuring and controlling or "autonomy supportive". Autonomy support concerns the extent to which the teacher supports freedom, enables and encourages initiative and choice in pupils, and shares in their perspectives when solving problems or offering advice (Reeve, 1998). The opposite of autonomy is control, as when the PE teacher is directive, authoritarian and pressuring (Black & Deci, 2000).

**The Role of a Mastery and Autonomy Supportive Climate versus a Performance-oriented Climate on Pupils' Self-regulation of Motivation**

Social factors in the form of environmental/situational cues, rewards and expectations perceived by pupils in the PE class could predispose them to adopt a particular mindset influencing how they motivationally respond and act when involved in the PE setting, leading to variations in affective, cognitive and behavioural responses (Vallerand & Losier, 1999).

**Mastery and performance climates.** As opposed to a performance climate, in which social comparison and being the best is nurtured, a task/mastery focus in the learning environment may lead pupils more easily to come to see mastery as equivalent to effort and progress, and that these aspects matter and are valued. Thus, the focus on progress, effort and accomplishment of tasks in the mastery-oriented class can strengthen pupils' belief in the utility of effort and their perceptions that development of ability can be attainable through effort. Hence, a mastery climate would seem important for intrinsically regulated motivation, in that such a climate would be able to foster challenge-seeking and lead to pupils becoming motivated by the intrinsic aspects of the tasks (e.g., doing, accomplishing and learning the skills of the tasks). Indeed, these are all aspects embedded in the concept of intrinsically regulated motivation. Further, because of its focus on improvement, learning and self-development at achievement tasks, a mastery climate may facilitate a sense of enjoyment. Nicholls (1989), Ames (1992) and Deci and Ryan (2000) all consider a mastery focus to be intimately linked to intrinsic motivation and positive affect.

A performance climate, in contrast, may come to weaken pupils' expectations for success, and deprive them from making effort–ability connections, leading to less optimism for learning and achievement. Consequently, a performance climate may facilitate less self-determined forms of motivation, negative affect, and eventually even amotivation due to reduced optimism for learning as a result of lack of belief in the utility of effort.

Indeed, previous research has revealed that perceiving the motivational climate as mastery-oriented is adaptive with respect to affect and motivation in PE and sport, whereas a performance-oriented climate seems detrimental with respect to affect and motivation (Carpenter & Morgan, 1999, Diggelidis & Papaioannou, 1999; Ferrer-Caja & Weiss, 2000; Papaioannou, 1995; Seifriz, Duda, & Chi, 1992; Standage, Duda, & Ntoumanis, 2003; Theeboom, De Knop, & Weiss, 1995; Treasure, 1997; Treasure & Roberts, 2001).

**Autonomy supportive climate.** As opposed to an autonomy supportive environment created by the teacher, a controlling or pressuring climate, like a performance climate, would be expected to lead to reduced levels of enjoyment in PE and to have negative effects on pupils' motivational self-regulation as reflected in reduced levels of self-determined motivation, and even amotivation. To foster autonomous or self-determined forms of motivational self-regulation, the teacher, who has the power to influence the pupils, should be autonomy supportive, as well as involved and providing the structure necessary for learning (Mageau & Vallerand, 2003). In particular, the autonomy supportive role of the teacher has been found to predict intrinsically regulated motivation in physical education (Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003), and providing girls in physical education with choices seems to relate positively to intrinsically regulated situational motivation and reduce levels of amotivation at the contextual level (Pusak et al., 2004). Further, in the competitive sport domain, Gagne, Ryan & Bargmann (2003) found that an
autonomy supportive climate generated by coaches and parents led to sustained positive emotions among young gymnasts, as indicated by increased levels of self-reported vitality and positive mood states during practice and competitions.

Relationships of Teacher Autonomy Supportive Behaviours and Motivational Climates to Motivational Styles: Mediating influences

According to the sequential pattern of relationships hypothesised to underlie human motivation, proposed by Vallerand and Losier (1999), the motivational model of the teacher–pupil relationship (Deci & Ryan, 1985, 2000) further proposes that the PE teacher behaviours embedded in the motivational climates influence pupils' motivation through their impact on pupils' basic psychological needs. Among these are perceptions of autonomy and perceptions of competence (Deci & Ryan, 1985, 2000). Hence, to the extent that pupils perceive that their teachers allow them to feel competent and autonomous in their behaviours, they will experience heightened levels of intrinsic motivation because their basic needs will be satisfied. Whereas the impact of autonomy supportive behaviours on perceived autonomy is intuitive, the impact on perceived competence does not appear to be equally straightforward (Mageau & Vallerand, 2003). However, being autonomy supportive implies that the pupils are encouraged to make choices and to take the initiative, while criticism, pressure and control is minimised. These behaviours signal a trust in pupils’ abilities, thus influencing their perceptions of competence. Autonomy supportive teachers would also be more apt to give non-controlling competence feedback, which may directly raise pupils' perception of their abilities.

It would also be reasonable to expect that a mastery climate fuels intrinsic motivation and self-determined forms of external motivation (identified and introjected), mediated by a sense of competence. A mastery climate seems able to foster a sense of competence that is more easily nurtured and more persistent, given that teachers then encourage pupils to make use of self-referenced and more personally controllable criteria to judge their competence. In contrast, a performance climate may come to reduce pupils' enjoyment and intrinsically regulated motivation. When a performance climate prevails, PE teachers typically emphasise social comparison, which may encourage pupils to use normative criteria and winning as the basis for judging their ability. Perceptions of competence may then become more fragile and less easily nurtured due to criteria which are not under personal control. Thus, reduced levels of self-determined motivation and even amotivation among some pupils may be facilitated in a performance climate mediated by lower levels of perceived competence. A performance climate could also inhibit intrinsically regulated motivation mediated by lowered levels of perceived autonomy. A performance climate may generate ego involvement, comprising a perceived pressure to maintain self-esteem (Ryan & Deci, 2000). Thus, a performance climate may be perceived as controlling, and may also negatively influence pupils' sense of autonomy. The existence of such a path would also be consistent with experimental research showing that under competitive conditions, individuals' sense of autonomy tends to be reduced. By the same token, a mastery climate may also facilitate intrinsically regulated motivation mediated by enhanced perceptions of autonomy (Sarrazin et al., 2002).

Taken together, it was expected that a mastery climate and teacher autonomy support would be positively related to intrinsically regulated motivation, both directly (Path C in Figure 1) and indirectly, mediated by perceived autonomy and perceived competence (Path A-B in Figure 1). A performance climate, in contrast, was expected to be negatively related to intrinsically regulated motivation and positively related to amotivation, both directly (Path C in Figure 1) and indirectly, mediated by perceived autonomy and perceived competence (Path A-B in Figure 1).

Climates, Mediators and Intrinsic Motivation as Precursors of Pupils' Interest/Enjoyment in PE and Self-reported After-school Physical Activity

The last part of the sequential pattern of relationships hypothesised to underlie human motivation, proposed by Vallerand and Losier (1999), corresponds to the affective, cognitive and behavioural consequences of motivation. Previous studies in the sport and PE domain (e.g. Ntoumanis, 2001a; Sarrazin et al., 2002; Standage et al., 2003) have, however, primarily focused on the different consequences of the

Figure 1. Hypothesised model of the influence of social factors and psychological mediators, both direct (C) and indirect (A-B), on the indices of variations in self-regulated motivation in PE, in turn influencing consequences (after Vallerand & Losier, 1999)
motivational regulation part of the model sequence, which is variations in self-determined motivation and amotivation. The present study adds to this focus by regressing affective and behavioural consequences (e.g. interest/enjoyment and physical activity and sports participation outside PE) on factors representing all sequences in the proposed model. This seems valuable in order to estimate the relative importance of the social factors, psychological mediators and motivation on selected consequences proposed by the model. Drawing upon Vallerand and Losier's proposed model (see Figure 1), we expected that social factors, psychological mediators and the indices of motivational self-regulation would all contribute to interest/enjoyment in PE and self-reported leisure-time physical activity and sports participation. A mastery climate, perceived teacher autonomy support, perceived autonomy and perceived competence as well as intrinsically regulated motivation were all expected to positively predict reported interest/enjoyment and involvement in leisure-time physical activity and sports participation, whereas a performance climate and amotivation were expected to relate negatively to these consequences. However, the indices of motivational self-regulation should be considered proximal influences, whereas the climates and teacher autonomy support represent distal influences (Vallerand & Losier, 1999). Hence, we expected intrinsically regulated motivation to be a relatively stronger positive predictor and amotivation to be a relatively stronger negative predictor of the affective and behavioural outcomes than the more distal factors.

Although there may exist mean differences in social factors, psychological mediators, motivation indices and behavioural consequences, Vallerand (1997) has argued that the motivational processes described in the model should be similar in all individuals. Hence, while controlling for gender in all analyses, the main study focus was the invariance of the sequential pattern of relationships in PE across gender.

Method

Participants

Students, aged 16 years old, attending 10th grade from five junior high schools in the western part of Norway participated in the study (N=194; boys n=100, girls n=94). The classes ranged in size from 16 to 29 students. All pupils approached agreed to participate and informed parental consent was obtained for each participant.

Measures

Perceived teacher autonomy support in PE. According to Deci and Ryan (1987), perceived autonomy support is the degree to which people perceive others in positions of authority to be autonomy supportive. In the present study, the authoritative others were the pupils' PE teachers. A modified version of the 15-item Sport Climate Questionnaire (long version) was used to measure perceived autonomy support during physical education. The wording of the Sport Climate Questionnaire was modified slightly to fit in with the context of physical education. Sample items are "I feel that my physical education teacher provides me with choices and options" and "I feel that my physical education teacher accepts me". The 15 items of the scale were rated on 5-point scales, anchored by "don't agree at all" (1) and "agree completely" (5). Support for the reliability and the validity of the 6-item short version of the scale modified for the physical education context has been obtained (e.g., Hagger et al., 2003). Cronbach’s alpha for the 15-item scale used in this study was .92.

Perceived motivational climate in PE. The 28-item PE Class Climate Scale (PECCS) (Biddle et al., 1995; Goudas & Biddle, 1994) originally consists of a task/mastery dimension comprising the four subscales of Class Learning Orientation, Teacher Promotion of Learning, Teacher Support and Pupils’ Choice. The performance dimension of the scale consists of the two subscales of Class Competitive Orientation and Worries about Mistakes. Responses were given on a 5-point Likert-type scale, anchored by "don't agree at all" (1) and "agree completely" (5). In previous research these subscales were found to load on two main dimensions (a mastery climate dimension and a performance climate dimension) in a second-order factor analysis (Ommundsen, 2001b). Thus, they were collapsed into two scales, one representing a mastery climate (19 items) and one a performance climate (12 items). However, in order to avoid conceptual overlap and interference with the Perceived Teacher Autonomy Support scale used in the present study, as well as the perceived autonomy scale (autonomy need satisfaction), only the 12 items comprising the PECCS Class Learning Orientation and Teacher Promotion of Learning subscales were used to measure a mastery climate. Based on the previously mentioned results from the second-order factor analysis (Ommundsen, 2001b), the items comprising the Class Learning Orientation and Teacher Promotion of Learning subscales were collapsed into a single scale and used to measure a mastery-oriented motivational climate. In the present study the Cronbach alphas for the scales were .86 for a performance climate and .90 for a mastery climate.

Perceived autonomy in PE. Pupils’ sense of having their need for autonomy in PE fulfilled was measured by means of six items derived from previous research assessing perceptions of autonomy in PE (e.g., Ntoumanis, 2001b; Standage et al., 2003), sport (Hollebeek & Amorose, 2005) and other life domains (e.g., Blais, Vallerand, & Lachance, 1990). Sample items included "I have some choice in what I want to do in PE"; "I have a say in what I do when taking part in PE"; "I feel forced to do things in PE, even when I don't really want to do them"; "I help decide what I do when participating in PE"; "I get to do the things I want to do when participating in PE"; and "I do not get to make decisions about what I do when I am participating in PE". Pupils responded to the stem, "Please mark the response that best reflects how you feel about the amount of choice or control you have when it comes to your
participation in PE”. Items were rated on 5-point scales, anchored by “don’t agree at all” (1) and “agree completely” (5). Chronbach’s alpha for this scale was .72.

Perceived competence in PE. Based on the work of Ryan (1982) and developed in the sport context by McAuley, Duncan and Tammen (1989) to measure intrinsic motivation following sport tasks, the 18-item intrinsic motivation index (IM) has been reworded in order to reflect the context of PE lessons by Goudas and Biddle (1994). For the current study, only the perceived competence subscale of the inventory was used. The scale consists of 4 items rated on 5-point scales, anchored by “don’t agree at all” (1) and “agree completely” (5). The stem was reworded to target the PE context, with pupils responding to the stem, “How good are you at PE?”. Two sample items from the Competence subscale are “I think I’m pretty good at PE” and “I cannot handle the different activities in PE very well”. In a previous study (Ommundsen, 2001a) a principal component analysis showed that all 4 items loaded on one factor, with factor loadings ranging from .81 to .67. The internal consistency of this scale has been found to be acceptable in previous PE-based research with samples of Norwegian and British children and adolescents (Goudas & Biddle, 1994; Ommundsen, 2001a; Standage et al., 2003). In the present study Cronbach’s alpha was .84.

Motivational self-regulation of motivation in PE. The self-regulation/perceived locus of causality assesses differences in the types of regulation of motivation. This scale assess five different motivational regulations for engaging in physical education lessons, based on the model set forth by Ryan and Connell (1989) and elaborated in the sport domain by Pelletier et al. (1995), as well as in the PE domain by Hagger et al. (2003). It consists of statements that answer the question “Why do you take part in physical education lessons?”, which pupils rated using a Likert-type scale from 1 (“completely disagree”) to 5 (“completely agree”). The perceived locus of causality in the physical education context measured each motivational style through 15 items, that is, three items for each of the five perceived loci of causality constructs. Three items assess intrinsic motivation (e.g., “For the pleasure I feel when I take part in physical education”; alpha=.85), three assess identified regulation (e.g., “It’s a good way to get exercise”; alpha=.79), three assess introjected regulation (e.g., “I would feel guilty if I did not take part in the physical education lessons”; alpha=.67), three assess external regulation (e.g., “My PE teacher and my parents would be mad if I didn’t participate in the PE classes”; alpha=.60) and three assess amotivation (e.g., “I’m not sure why I take part in physical education classes, I don’t seem to be going anywhere with it”; alpha=.69). Items were rated on 5-point scales, anchored by “don’t agree at all” (1) and “agree completely” (5). Although some of these reliabilities should be considered low, they were calculated with only three items each, which lowers estimates of reliability. The reliabilities are similar to the ones obtained in other research using children (e.g., Ryan & Connell, 1989, in which alphas ranged from .62 to .82) and both children and adolescents (e.g. Gagne et al., 2003; Hagger et al., 2003, in which alphas ranged from .53 to .88, and from .66 to .87 respectively). For sake of parsimony, and in line with previous research, the subscale scores were combined into a composite index of self-determined or intrinsically regulated motivation to form a relative autonomy index (RAI), computed using the following formula (Grolnick & Ryan, 1987):

\[
\text{RAI} = 2 \times \text{(intrinsic motivation)} + \text{(identification)} - 2 \times \text{(external regulation)}
\]

In addition, separate scores based on the subdimensions of amotivation and intrinsic motivation were also used to tease out differential relationships on the extremes of the relative autonomy continuum.

Interest/enjoyment in PE. To assess the pupils’ interest/satisfaction in PE classes, the pupils responded to a modified 9-item scale designed to assess interest/enjoyment in PE. The scale is adapted from Williams and Deci (1996), and has been used in previous classroom research (Black & Deci, 2000). The scale asks pupils to rate the truth of nine statements (e.g., “I enjoy learning about PE”, “I usually enjoy taking part in the PE lessons”, and “PE is a subject I find interesting”). The total score is the sum of 9 items, and the scale was given a modified stem to fit into the context of physical education classes. Factor analysis of the responses to these 9 items revealed a single-factor solution. The responses were indicated on 5-point Likert-type scales, anchored by “don’t agree at all” (1) and “agree completely” (5). Cronbach’s alpha for the scale in the present study was .93.

After-school/leisure-time physical activity. After-school physical activity was measured by means of a single-item question, “Do you participate in any kind of physical activity and sport in your leisure time?”, with a dichotomous response of “yes” or “no”.

Procedures

Principals and PE teachers from five secondary schools received a letter to explain the purpose of the study and the request that their students in 10th grade volunteer as participants. On the days of data collection a research assistant visited the schools, distributed the questionnaires and provided instructions in the physical education classes. After providing informed consent, pupils completed the questionnaire anonymously in about 35-40 minutes in a classroom setting. Data were collected at the end of the physical education term, thus allowing the pupils to have gained experience of the climates and perceptions of the teacher’s style as potential influencing factors.

Results

Three sets of analyses were conducted. First, the zero-order relationships among the independents, mediators and outcome variables were examined. In addition, gender
differences with respect to these variables were assessed. Secondly, the hypothesised model comprising direct and indirect influences of the independent variables on the motivational outcome indices (see Figure 1) was tested using path analysis. Finally, logistic regression was performed to examine the influence of the total set of predictors on after-school physical activity.

**Descriptive Analysis**

Means, standard deviations and correlations between variables are shown in Table 1. The mean values indicate that the pupils experienced their PE classes as quite enjoyable and intrinsically motivating. Furthermore, they perceived the climate as quite highly mastery-oriented and their PE teachers were to some extent perceived as providing autonomy support. Their competence perceptions and to some extent also perceptions of autonomy were quite high.

Gender differences were revealed on the following constructs. Boys (M=3.39) were found to experience the climate as more performance-oriented than girls (M=3.12) (t=-2.07, p<.01), and boys (M=4.11) were found to perceive their competence in PE as higher than girls did (M=3.76) (t=-2.48, p<.01). Given these differences by gender, gender was controlled for in all subsequent analyses by entering it into all regressions in the first step.

In terms of interrelations among the variables, a quite consistent and expected pattern of interrelations between the independent and dependent variables was observed. First, interest/enjoyment and RAI correlated significantly with a mastery climate, perceived teacher autonomy support, perceived competence and perceived autonomy. In contrast a performance climate was unrelated to RAI, interest/enjoyment, perceived competence and perceived autonomy. The expected negative correlation (−.52) between the RAI score and amotivation, as well as the positive correlation (.65) between RAI and intrinsic motivation, also adds to the validity of the RAI score procedure. Using one data source to measure very closely related theoretical constructs may create concerns about mono-method bias and confounded measures (Lindell & Whitney, 2001). In the present case (as suggested by one reviewer) we conducted factor analysis with varimax rotation to see evidence of the discriminant validity of main theoretical constructs. Indeed, such evidence was found as reflected in genuine factor loadings for all constructs and cross-loadings generally being below .32. One exception was enjoyment/interest and intrinsically regulated motivation subdimension which, as could be expected, had a high cross-loading. Hence, in predicting enjoyment/interest, we only made use of the total RAI index together with the amotivation dimension measure.

**Path Analyses**

Figure 1 shows the hypothesised model used to assess the relationship of climates, perceived autonomy support, perceived competence and perceived autonomy to variations in self-regulation/perceived locus of causality, factors that were all thought in turn to influence interest/enjoyment and after-school physical activity. Path analyses were conducted to examine the direct and indirect relations among the variables. The path model was constructed in two steps. First, perceived competence and perceived autonomy were separately regressed on the climate and perceived teacher autonomy (independents). Next, RAI, intrinsic motivation and amotivation were separately regressed on the climate, perceived teacher autonomy, perceived competence and perceived autonomy (independents and mediators). Gender was controlled for in all analyses. Significant paths of the fully estimated models for each of the three indices of self-regulation/perceived locus of causality are shown in Figures 2 to 4. Standardised beta coefficients are reported as path coefficients illustrating the strength of each explanatory variable controlling for all other explanatory variables in the model. Results are organised around the three sets of relations proposed in the model in Figure 1. These are the influences of climates and perceived teacher autonomy on perceived competence and perceived autonomy (A), and direct (C) and indirect (A-B) influences of climates and perceived teacher autonomy on intrinsic motivation, total RAI and amotivation.

**Influences of Climates and Perceived Teacher Autonomy Support on Perceived Competence and Perceived Autonomy**

Altogether, the predictors accounted for 38% and 22% of perceived autonomy (F(4,192)=28.6, p<.001) and perceived competence (F(4,192)=13.2, p<.001), respectively. A mastery climate positively influenced perceived competence (beta=.30, p<.001) and perceived autonomy (beta=.33, p<.001), whereas perceived teacher autonomy support positively influenced perceived competence (beta=.23, p<.001) and perceived autonomy (beta=.31, p<.001). In contrast, a performance climate

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**Table 1. Descriptive statistics (alphas, means and standard deviations) and zero-order correlations for motivational climates, perceived teacher autonomy support, perceived autonomy, perceived competence and enjoyment and self-regulated motivation (N=194)**

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<th>Variable</th>
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<tbody>
<tr>
<td>1. Enjoyment/interest</td>
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<td>3.76</td>
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<td>2. RAI</td>
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<td>3. Mastery climate</td>
<td>.90</td>
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<td>4. Performance climate</td>
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<td>5. Teacher autonomy support</td>
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<td>3.31</td>
<td>.96</td>
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<td>6. Perceived autonomy</td>
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<td>3.49</td>
<td>1.11</td>
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<td>7. Perceived competence</td>
<td>.84</td>
<td>3.94</td>
<td>.99</td>
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<td>8. Intrinsic motivation</td>
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<td>3.67</td>
<td>1.14</td>
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<td>9. Amotivation</td>
<td>.69</td>
<td>1.99</td>
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*Dichotomous variable (1=participate, 0=not participate). *p<.05. **p<.01.*
Influences on Intrinsic Motivation, Total RAI and Amotivation

The full model consisting of predictors and mediators explained 49% of the total variance in intrinsic motivation ($R^2_{6,192}=29.9$, $p<.001$). As revealed in Figure 2, intrinsic motivation was positively and genuinely predicted by a mastery climate ($\beta=.33$, $p<.001$) and by teacher autonomy support ($\beta=.22$, $p<.001$) as well as by perceived competence ($\beta=.32$, $p<.001$). Performance climate was not significantly related to intrinsic motivation. Apparently, intrinsic motivation seems to be facilitated when pupils perceive their competence as high and when they feel teachers emphasise effort and progress and devalue social comparison, as well as when they perceive PE teachers as providing non-controlling feedback, giving pupils opportunities for initiative and independent work and avoiding controlling behaviours.

The full model explained 25% of the total variance in the self-determination motivational continuum as measured by the RAI index ($R^2_{6,192}=10.1$, $p<.001$).

When all variables were in the model (see Figure 3), RAI was positively predicted by a mastery climate ($\beta=.18$, $p<.05$) and perceived competence ($\beta=.26$, $p<.001$). In contrast, performance climate, perceived teacher autonomy support and perceived autonomy did not genuinely influence RAI. Hence, increasing levels of...
intrinsically regulated motivation seem to be enhanced by high perceptions of competence and to some extent also a perception of the motivational climate as emphasizing effort and progress.

The full model explained 38% of the total variance in amotivation ($F_{6,192}=19.3$, $p<.001$). When all variables were in the model (see Figure 4), amotivation was positively predicted by a performance climate (beta = .13, $p<.05$ and negatively by teacher autonomy support (beta = -.21, $p<.001$), a mastery climate (beta = -.27, $p<.001$) and perceived competence (beta = -.30, $p<.001$). Perceived autonomy was found to be unrelated to amotivation. Apparently, amotivation seems inhibited by a mastery climate, perceived autonomy support and perceived competence within this sample of pupils, whereas a performance climate to some extent facilitates amotivation. A summary of beta weights and variance accounted for by the two climates, perceived teacher autonomy support, perceived competence and autonomy support on the three motivational self-regulation indices is presented in Table 2.

The Mediating Influence of Perceived Autonomy and Perceived Competence

The next set of analyses was conducted to determine whether perceived autonomy and perceived competence mediated the relationship between motivational climates, perceived teacher autonomy support on the one hand and the motivational indices on the other (e.g. intrinsic motivation, RAI and amotivation). According to Baron and Kenny (1986), four conditions need to be established to determine mediation (see Figure 1). These are (a) a significant relation existing between the independent variable and the dependent variable (Path C), (b) a significant relation existing between the independent variable and the mediating variable (Path A), (c) a significant relation existing between the mediating variable and the dependent variable (Path B), and (d) the relation between the independent variable and the dependent variable (Path C) being significantly reduced when the mediating variable is included in the regression equation. Some statisticians hold that no standard objective test can determine if a variable is fully or partly mediated (Aiken & West, 1991; Judd & Kenny, 1981). Hence, they argue that two criteria—the decrease in significance level and the decrease in the magnitude of the beta coefficient—should be used together to examine mediation. If the relation between the independent variable and the dependent variable is reduced to zero or is no longer significant, then there is full mediation, and if the relation between the independent variable and the dependent variable is attenuated but is still significant, then partial mediation is said to exist (Aiken & West, 1991; Baron & Kenny, 1986). However, others have argued (e.g., Sobel, 1982) that once the regression coefficient for the indirect effect is calculated, it needs to be tested for significance. In the present case we used the Sobel test to assess whether the regression coefficient was significantly reduced after including the mediating variable in the equation.

The results of the path analysis for intrinsic motivation, RAI and amotivation have already shown that for perceived competence as mediators, conditions (b) and (c) necessary for mediation (see above) have been established. Specifically, in the case of intrinsic motivation and amotivation, a mastery climate as well as teacher autonomy support both associated positively with perceived competence, which in turn associated positively with intrinsic motivation and negatively with amotivation. In the case of RAI, a mastery climate positively associated with perceived competence, which in turn associated positively with RAI. By contrast, for perceived autonomy, only the second condition (Path A) has been established as indicated by a mastery climate predicting perceived autonomy, whereas perceived autonomy predicted

<table>
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<th>Influence on</th>
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<th>Beta</th>
<th>$R^2$</th>
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Note. Gender included as statistical control in all analyses (not shown). *$p<.05$. **$p<.01$. ***$p<.001$. 


neither intrinsic motivation, RAI nor amotivation. Moreover, in the case of amotivation, no performance climate-perceived competence relationship (Path A) was found. Hence, in the case of intrinsic motivation, RAI and amotivation, further mediation analyses were only performed with mastery climate and perceived teacher autonomy support as predictors and perceived competence as a potential mediator. No further mediation analyses were performed in the case of performance climate.

To establish the third and fourth conditions for mediation, a multiple regression strategy suggested by Judd and Kenny (1981) was used. Separate hierarchical multiple regression analyses were conducted with a mastery climate and teacher autonomy support in the first step and perceived competence entered in the second step. These analyses allowed for a determination of the relationships between mastery climate and perceived teacher autonomy support and intrinsic motivation, RAI and amotivation independent of perceived competence (condition [c]). Further, it was possible to examine the degree to which the regression coefficients for mastery climate and perceived teacher autonomy support were significantly reduced after perceived competence was entered into the regression (condition [d]). It was reasoned that if the impact of the mastery climate or perceived teacher autonomy were significantly reduced, mediation could be said to exist (Sobel, 1982). Further, in line with the aforementioned rules of thumb regarding mediating effects, if this reduction is substantial, partial mediation is said to exist, whereas complete mediation is said to exist in the case of a complete reduction, yielding a beta weight of approximately zero for the predictor (Aiken & West, 1991). The results of the hierarchical regression analyses (full models) are presented in Figures 2 to 4 and Table 2.

**Intrinsic motivation and amotivation.** For intrinsic motivation and amotivation, both climate (beta = .33, p < .001, and beta = -.27, p < .001, respectively) and teacher autonomy support (beta = .22, p < .001, and beta = -.21, p < .001, respectively) were significant influences in the full models (see Figures 2 and 4 and Table 2). When perceived competence (beta = .33, p < .001) was included in the mediation model for intrinsic motivation in step 2, and in the model for amotivation (beta = -.32, p < .001) the beta coefficient for mastery climate dropped from .40, p < .001, to .32, p < .001 (Sobel test; z = 2.16, p < .05) in the case of intrinsic motivation (see Figure 2), and in the case of amotivation (see Figure 4) from -.26, p < .001, to -.18, p < .001 (Sobel test; z = 2.11, p < .05). Thus, in the case of both intrinsic motivation and amotivation the predictive effect of a mastery climate was mediated by perceived competence. However, the direct effect of the climate was not completely attenuated. Hence, partial mediation is shown to exist (Aiken & West, 1991). Further, when perceived competence was included in the analyses comprising the mediation models (step 2), the beta coefficient for perceived teacher autonomy support dropped from .27, p < .001, to .19, p < .001 (Sobel test; z = 2.03, p < .05) in the case of intrinsic motivation, and in the case of amotivation the beta coefficient for perceived teacher autonomy dropped from -.31, p < .001, to -.23, p < .001 (Sobel test; z = 1.99, p < .05). Thus for both outcomes, the predictive effect of perceived teacher autonomy support was partially mediated by perceived competence (Aiken & West, 1991). Hence, taken together results indicate that perceived competence partially mediated the effects of a mastery climate and perceived teacher autonomy support on intrinsically regulated motivation and amotivation.

**RAI.** A mastery climate (beta = .18, p < .001) was a significant influence on RAI in the full model (see Figure 3 and Table 2). In step 2, when adding perceived competence to the equation in the mediation models (beta = .25, p < .001; not shown in Figure 3 and Table 2), the beta coefficient for mastery climate dropped from .41, p < .001, to .31, p < .001 (Sobel test; z = 2.16, p < .05). Hence, the findings that the beta coefficient for a mastery climate was still high and significant, and that its reduction was only marginally significant, indicate that the mediating influence of perceived competence is partial and only marginally statistically significant (Aiken & West, 1991; Sobel, 1982).

**Motivational Climates, Psychological Mediators and Motivational Regulation as Predictors of Interest/Enjoyment in PE**

As revealed in Table 2, multiple regression analysis with simultaneous entry of all predictors revealed that 70% of the variance in pupils’ self-reported interest/enjoyment in PE was explained by the variable set (R² = .70 = 52.8, p < .001). A mastery climate (beta = .16, p < .01), perceived teacher autonomy support (beta = .18, p < .01), perceived competence (beta = .25, p < .001) and self-determined motivation (RAI) (beta = .27, p < .001) all genuinely and positively predicted higher levels of self-reported interest/enjoyment in PE. Amotivation (beta = -.23, p < .001), in contrast, negatively predicted interest/enjoyment. Neither a performance climate (beta = .06, p > .05) nor perceived autonomy (beta = -.02, p > .05) significantly predicted interest/enjoyment.

**Motivational Climates, Psychological Mediators and Motivational Self-regulation Indices as Predictors of After-school Physical Activity**

A forward stepwise binary logistic regression analysis was performed with the dichotomous variable "Participation in leisure-time physical activity and sport" (responses "yes" or "no") as dependent variable and the social influence factors, psychological mediators and the self-regulation of motivation index (RAI) as predictors. Again gender was controlled for. Predictors were entered based on the most significant score statistic with a p of .05 or less and were removed if the p of the −2 log likelihood test was greater than .10. Perceived competence was entered first (chi-square = 21.02, p < .001), and self-determined motivation (RAI) (chi-square = 5.02, p < .05). A mastery climate, a performance climate, perceived teacher
autonomy support (social influence factors) and perceived autonomy (mediator) did not provide a significant increment in the fit of the model. Thus, results indicate that pupils’ probability of being physically active after school was associated with stronger competence perceptions and stronger intrinsically regulated motivation as revealed by a higher RAI score. The two factors accounted for 14% of the variance in pupils’ self-reported after-school physical activity.

Discussion

The present research examined the role of social and psychological factors embedded in achievement goal theory and cognitive evaluation theory on secondary school pupils’ self-determined motivation and positive affect in PE. Also investigated was the predictive influence of social factors, psychological mediators and self-regulation of motivation in PE on pupils’ participation in after-school physical activity. Several findings suggest that by blending aspects from these two theoretical frameworks, our understanding of variations in pupils’ self-regulation of their motivation, interest/enjoyment in PE and after-school physical activity may be enhanced.

The Role of Mastery-oriented, Performance-oriented and Autonomy Supportive Climates in Pupils’ Intrinsicly Regulated Motivation and Amotivation

Pupils’ self-report of their PE class climate as encouraging effort, progress and the promotion of mastery was genuinely and positively associated with higher levels of intrinsically regulated motivation and lower levels of amotivation. The results for a mastery climate held both when using the relative autonomy index score (RAI) as well as when applying the intrinsic motivation subdimension score as an indicant of purely intrinsically regulated motivation. A nearly parallel pattern of relations was found for perceived teacher autonomy support. This was evident, first, in that autonomy support was a positive precursor of intrinsically regulated motivation as measured by the intrinsic motivation subdimension and RAI, and secondly, in that autonomy support was a negative precursor of amotivation. The pattern of findings for a mastery climate are in line with previous findings in the PE domain, showing a cluster labelled as self-determined displaying a high mastery climate going together with high self-determined motivation, enjoyment, and low amotivation (Ntoumanis, 2002). Results suggest that pupils who perceive their PE climates to be characterised by personal improvement and progress through effort and mastery are more likely to be intrinsically motivated (Vallerand, 1997). The role of autonomy support is in line with previous studies in the academic domain revealing a predictive role of autonomy supportive behaviours in students’ increase in autonomous self-regulation over the semester in chemistry classes (Black & Deci, 2000).

Apparently, PE teachers may be able to reinforce intrinsically regulated motivation among pupils and inhibit amotivation, first by emphasising progress, effort and mastery in the class, and secondly by supporting pupils’ sense of freedom, enabling and encouraging initiative and choice, and sharing their perspectives when solving problems or offering advice in PE (Reeve, 1998). A performance climate was shown to be marginal at best in the prediction of pupils’ motivational self-regulation in PE. Nevertheless, a performance climate was found to be a direct positive predictor of pupils’ self-reported amotivation. Additional analyses (not shown) further revealed no moderating effect of perceived competence in this relationship. Hence, these findings suggest that a performance climate may cause enhanced levels of amotivation, irrespective of variations in pupils’ level of perceived competence. Further, PE teachers may be able to prevent pupils from losing interest and developing a lack of motivation. To this end they should reduce an emphasis on interpersonal competition, public evaluation and normative feedback. Taken together, findings are in line with those from previous studies that have blended factors emanating from achievement goal theory and social evaluation theory in the prediction of young people’s motivation in PE and sport (Ferres-Caija & Weiss, 2000; Ntoumanis, 2001b; Standage et al., 2003).

Mediating Influences

Results also revealed significant indirect paths in the social factors: self-determined motivation and amotivation relationships through psychological mediators. Specifically, whereas no mediation effects of perceived autonomy on the indices of intrinsically regulated motivation and amotivation were found, high perceived competence partially mediated the positive influence of a mastery climate and perceived teacher autonomy support on intrinsic motivation and the self-regulation of motivation continuum (RAI). Further, mediation analyses suggest that both a mastery climate and teacher autonomy to some extent fuelled perceived competence, which in turn counteracted amotivation. Hence, apart from direct effects of a mastery climate and teacher autonomy support, results expand previous research by revealing perceived competence to be a consistent mediating factor in the association of both a mastery climate as well as teacher autonomy support to all three indices of self-regulation of motivation.

These findings add support to the sequential pattern of relationships hypothesised to underlie human motivation (Vallerand & Losier, 1999). They also indicate that a mastery climate and autonomy support may directly give rise to intrinsically regulated forms of motivation and prevent a sense of not being motivated in the gym. Perceived autonomy was also expected to operate as a mediating influence. According to Deci and Ryan (1985), perceived autonomy and perceived competence (as well as relatedness, which is not focused on in the present case) should all be influenced in order for intrinsically regulated motivation to flourish. However, the relative importance of the proposed mediators in the cognitive evaluation model of motivation may depend on their situation/context-specific functional significance (Deci & Ryan, 1985). In PE, a sense of competence may be more crucial for
intrinsicly regulated motivation and in order to preventing amotivation. Pupils' prior experiences with different activities vary a lot in PE, and many pupils may feel less than competent. Hence, a sense of competence may be particularly likely to elicit pupils' intrinsic motivation in which intrinsic aspects such as excitement, stimulation and accomplishment regulate the activities. Results run counter to predictions from cognitive evaluation theory, which holds that people need to feel autonomous as well as competent in order to be intrinsically motivated (Deci & Ryan, 1991). Indeed, a stronger mediating effect of perceived competence than perceived autonomy has also been observed in previous PE research (e.g., Ntoumanis, 2001a).

Even if perceived autonomy did not operate as a mediating mechanism, both a mastery climate and perceived autonomy support associated positively with perceived autonomy. Interestingly, a mastery climate was shown to be as strongly associated with perceived autonomy, as was teacher autonomy support. These findings deviate from findings in the PE domain by Standage and coworkers (Standage et al., 2003), who found an autonomy supportive climate (e.g., an "origin" climate) to be more strongly related to pupils' perceived autonomy than a mastery climate. From the present results it appears that when teachers enable and encourage initiative and choice in pupils and share in their perspectives when solving problems or offering advice, as well as generating cues signalling the value of progress and mastery and a belief in pupils that success is achieved through hard work, pupils' feeling of being in control of their achievement by having a sense of autonomy is reinforced.

The three social influence factors and the two psychological mediators explained between 25% and 47% of the variance in three indices of motivation (e.g., the intrinsic motivation subsdimension, the self-determination index [RAI] and the amotivation subsdimension). The lower variance in RAI accounted for by the two sets of variables may be attributed to the fact that the RAI represents the whole continuum of variation in self-determined motivation (intrinsic, identified, introjected and extrinsic), whereas the other two represent two "purified" contrasts at each end of the spectrum of pupils' self-regulation of their motivation in PE (Vallerand, 1997).

The Role of Climates, Perceived Autonomy, Competence and Motivational Self-regulation on Pupils' Interest/Enjoyment

The last part of the sequential pattern of relationships hypothesised to underlie human motivation, proposed by Vallerand and Losier (1999), corresponds to the affective, cognitive and behavioural consequences of motivation. In general, the pattern of influences supported our expectations. First, results extend previous research by revealing that social factors (e.g., a mastery climate and teacher autonomy support) and psychological mediators (e.g., perceived competence) as well as intrinsically regulated forms of motivation and amotivation predicted interest/enjoyment. Further, as would be expected, intrinsically regulated motivation and amotivation, as proximal influences, were found to relate more strongly to interest/enjoyment than did mastery climate and teacher autonomy support (distal factors). Perceived competence, however, was equally strongly positively related to interest/enjoyment, as were intrinsically regulated motivation (as measured by the RAI score) and amotivation (negatively related). The latter finding attests to the importance of positive ability perceptions for a sense of interest and enjoyment in PE, and supports previous findings in the domain of youth sport revealing a strong perceived competence-intrinsic motivation relationship (e.g., Boyd & Yin, 1996; Brustad, 1988; Ommundsen & Vaglum, 1991).

The considerable amount of variance accounted for by these variables in interest/enjoyment leaves the PE teacher with several opportunities and strategies to reinforce stimulating and enjoyable experiences in PE. By reinforcing a mastery climate and perceived autonomy and by providing positive feedback to stimulate competence perceptions and intrinsically regulated motivation (Vallerand & Reid, 1984), teachers may stimulate pupils' interest and enjoyment (Black & Deci, 2000).

The Role of Motivational Climates, Perceived Autonomy and Competence on Pupils' After-school Physical Activity

Little research has examined the extent to which the psychological dimension of the school physical education context is related to pupils' after-school leisure-time physical activity. We found perceived competence and intrinsically regulated forms of motivation to be genuine positive predictors of leisure-time physical activity. Apparently, the factors influencing interest/enjoyment in PE and those predicting after-school physical activity are partly different, those in common being perceived competence and intrinsically regulated motivation. These findings mirror previous results that have found feelings of incompetence and extrinsically regulated motivation to be predictive of dropout from organised team sports (Ommundsen & Vaglum, 1992; Sarrazin et al., 2002). An additional binary logistic regression analysis including interest/enjoyment in PE as a predictor variable (not shown) was performed to check for its influence on after-school physical activity. Results revealed that PE interest/enjoyment now suppressed perceived competence and intrinsically regulated motivation as influences, with interest/enjoyment now being the only predictive factor. Given its proximal nature in the prediction of behaviour outside PE, this makes sense. Apparently, perceived competence and intrinsically regulated motivation influence after-school physical activity through PE interest/enjoyment.

The predictive role of perceived competence and intrinsically regulated motivation on after-school physical activity bear some resemblance to previous findings, showing that leisure-time physical activity was influenced through a motivational sequence involving enhanced self-determined motivation in PE, and enhanced leisure-time-specific self-determined motivation, perceived behavioural control and intentions to be active (e.g., Hagger et al., 2003). Further, whereas Carroll and
Loumidis (2001) found perceived competence, but not enjoyment, in PE to be associated with after-school physical activity, Standage et al. (2003) obtained results supporting enhanced self-determined motivation as a positive direct predictor of leisure-time physical activity intentions, and perceived competence as a positive predictor, mediated by reduced amotivation. Apparently, teachers may successfully stimulate pupils to be more physically active and to play more sports in their leisure time by enhancing their competence perceptions and their intrinsically regulated motivation in PE. Further, as revealed by regression-based path findings, to this end PE teachers may benefit from focusing on pupils’ progress, effort and mastery in PE classes as well as by emphasizing support of autonomy among their pupils.

This study has a number of limitations. First, it was conducted in a restricted school community and within one particular class level. More research is needed using a variety of school settings and also different age groups. Secondly, we used cross-sectional data. Longitudinal and experimental studies are needed to understand issues of causality and how social-contextual factors and psychological mediators in PE operate to stimulate both intrinsically regulated motivation and enjoyment/interest in PE as well as transcontextual physical activity. Indeed, a longitudinal study has provided encouraging results (Hagger et al., 2003). Thirdly, the amount of variance in leisure-time physical activity and sports participation tends to decrease with age (Sallis et al., 2000). Hence, among these 10th-graders, additional factors outside the PE domain may work to reduce leisure-time physical activity.

The strength of the study is reflected in generally consistent patterns of findings supporting the sequential model of self-determined motivation (Vallerand & Losier, 1999), using a measure of motivational regulation that is clearly different from antecedents and consequences within the model. Further, the amount of variance accounted for by the social influences and psychological mediators in intrinsically regulated forms of motivation, in amotivation as well as in interest/enjoyment, was quite high.

Future studies would do well, however, to test out these relationships using structural equation modelling (SEM). SEM analysis facilitates model estimation, evaluation of model fit, and correct and meaningful estimation and interpretation of path coefficients using latent rather than observed variables. Studies should also examine additional relationships between social-contextual factors, self-regulation of motivation and cognitive consequences emanating from the achievement goal approach and self-determination theory. For example, it would be fruitful to examine the role of autonomy support versus mastery and performance climates as well as pupils’ differential achievement goals for pupils’ self-regulation of their learning in PE (Ommundsen, 2006). Studies would also do well to record actual levels of physical activity via heart-rate monitors or by means of other devices, making it possible to objectively measure physical activity in and out of physical education classes (Jaakkola, Liukkonen, Ommundsen, & Laaksi, 2007). An additional avenue for future research would be to use an ideographic approach to unravel strategies by which levels of amotivation can be reduced (Ntoumanis, Ponsaers, Martin, & Pipe, 2004).

In conclusion, findings reveal that a mastery climate and perceived autonomy support, as well as perceived competence, are powerful correlates of pupils’ intrinsically regulated motivation and interest/enjoyment in PE. Further, results suggest that pupils who are intrinsically regulated and have a strong sense of being competent in PE are more apt to be physically active during their leisure time after school. Clearly, blending tenets of achievement goal theory and self-determination theory seems fruitful and the pattern of findings illustrates the importance of studying paths between distal contextual factors and more proximal psychological mediating influences when examining variations in pupils’ physical activity behaviour, motivation and affect, both within and outside the context of PE.

References


