

## Peer influence on young athletes' need satisfaction, intrinsic motivation and persistence in sport: A 12-month prospective study

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### ABSTRACT

**Objective:** Previous studies have shown that peer-created motivational climate greatly influences youth athletes' motivation and other adaptive outcomes. The purpose of this study was to test a motivational model of persistence in sport that incorporates perceived peer motivational climate from achievement goal theory [Nicholls, J.G. (1989). *The competitive ethos and democratic education*. Cambridge, MA: Harvard University Press] and basic psychological needs and intrinsic motivation from self-determination theory [Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behaviour*. New York: Plenum].

**Design:** This study used a prospective design assessing youth team-sport athletes' persistence behaviour in sport over the course of one year.

**Method:** A sample of 424 Estonian team-sport athletes ( $M_{age} = 13.19$ ;  $SD = 1.56$ ) completed the Peer Motivational Climate in Youth Sport Questionnaire, the Basic Psychological Needs in Exercise Scale, and the Sport Motivation Scale.

**Results:** A structural equation model demonstrated that youth athletes' task-involving peer motivational climate indirectly influenced their intrinsic motivation and persistence in sport via their perceived need satisfaction of autonomy, competence, and relatedness. Task-oriented peer motivational climate was the only significant distal predictor of intrinsic motivation and sport persistence among the athletes.

**Conclusion:** The findings underline the importance of peer-created motivational climate on youth sport persistence.

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A large number of children and young people regularly engage in organized sport programs and it is an important influence on physical and psychological well-being. This mass involvement, however, masks high rates of dropout from sport often observed in children and young people. Dropout rates in youth sports continue to be a major concern for sports leaders, coaches, and physical educators. Sport psychology researchers have therefore sought to investigate the motives behind sport participation with the goal of curbing the high rates of dropout (Sarrazin, Boiché, & Pelletier, 2007).

Theories of motivation have been adopted to understand persistence or dropout behaviour in youth sport for the past three decades (Bars, Gernigon, & Ninot, 2009; Cervelló, Escartí, & Guzmán, 2007;

Fraser-Thomas, Cote, & Deakin, 2008; Gould, 1987; Gould, Feltz, Horn, & Weiss, 1982; Roberts, 1992, 2001; Sarrazin, Vallerand, Guillet, Pelletier, & Cury, 2002). Motivational theories share common features in the social–contextual factors (e.g., coaching style, learning climate) and interpersonal variables (e.g., perceived competence, perceived autonomy, self-regulation, general causality orientations) that are proposed to influence sport behaviour (Deci & Ryan, 2000; Hagger & Chatzisarantis, 2011; Hagger, Wood, Stiff, & Chatzisarantis, 2010). In this respect sport dropout has been attributed to a lack of motivation (Gould, 1996) and self-regulatory skills (Hagger, Wood, Stiff, & Chatzisarantis, 2009). Therefore, many researchers have emphasized the importance of understanding the motivational processes that lead to dropout from sport (Petlichkoff, 1993; Weiss & Petlichkoff, 1989; Weiss & Williams, 2004). While previous studies have accounted for social factors like adults' influences on athletes' motivation and persistence behaviour in sport, the influence of peer groups is still a relatively unexplored social–contextual factor in this domain. The general goal of this study is to investigate the effects of dimensions of peer-created environment and basic psychological

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needs on intrinsic motivation and, consequently, persistence in youth sport.

### Achievement goal theory and self-determination theory

Several models integrating the elements of achievement goal theory (AGT; Nicholls, 1989) and self-determination theory (SDT; Ryan & Deci, 2000, 2002) have been developed to explain dropout or persistence in sport (Boiché & Sarrazin, 2009; Cervelló et al., 2007; Pelletier, Fortier, Vallerand, & Brière, 2001; Sarrazin et al., 2002). The virtues of integrating theories to promote complementarity and reduce redundancy are well documented and such integrated models may offer a more parsimonious, comprehensive explanation of sport-related behaviour (Hagger, 2009; Orbell, Hagger, Brown, & Tidy, 2006). We present an integrated model adopting components from AGT and SDT to develop our hypotheses for the current study. In this section, we will outline the key components of the constituent theories from both models and demonstrate how they assist in developing an understanding of the processes behind sport dropout in young people.

AGT postulates that individuals in achievement settings may interpret their success with respect to two orientations, learning or task orientation and performance or ego orientation. Individuals exhibiting a predominant task orientation tend to focus on improving performance relative to their own past performance rather than comparisons with others. They tend to be more persistent under failure and intrinsically motivated because the indicators of success on which they focus are internal and more controllable. Individuals with a predominant ego orientation tend to interpret success as performing well relative to, or in comparison with, others. Individuals oriented towards this goal perspective tend to select tasks that are easier to perform and are less persistent when it comes to failure. Although it is usual for individuals to adopt a 'dominant' goal perspective, the orientations are not orthogonal, and people can hold both perspectives at once.

Ames (1992) has argued that individual goal orientations may be influenced by the motivational climate created by the actions of salient interpersonal agents in the environment such as significant others. Motivational climate usually refers to the social environment that operates in achievement contexts fostered by salient others. These 'others' can be teachers and parents for young people and supervisors and significant others for adults. The motivational climate can be characterized as either task- (i.e., emphasizing learning processes, improvement and effort) or ego-involved (i.e., emphasizing competition, winning, and social comparison) (Ames, 1992; Duda, 2001; Duda & Hall, 2000; Nicholls, 1989). Studies in youth sport and PE contexts have generally focused on the role of the teacher (Walling, Duda, & Chi, 1993) or coaches (Sarrazin et al., 2002) in establishing the motivational climate. However, it is important that the potential influence of peers is not neglected. In this respect Ntoumanis and Vazou (2005) proposed a two-factor model of peer motivational climate comprising task-involving (consisting of the sub-dimensions of Improvement, Effort and Relatedness/Support) and ego-involving (consisting of the Intra-team Competition/ability and Intra-team Conflict lower-order sub-dimensions) dimensions. According to their conceptualization, it is important to evaluate the effects of perceived motivational climate from both sources, adults and peers, in order to provide a comprehensive evaluation as to the factors that influence sport involvement in young people.

According to SDT, reasons why individuals persist with or refrain from sport and physical activity can be conceptualized along a continuum of self-determined motives that differ qualitatively in the perceived origin or causality of action (Chatzisarantis, Hagger,

Biddle, Smith, & Wang, 2003; Deci & Ryan, 1985, 2000). The theory focuses on the extent to which these motives are perceived as autonomous or self-determined (Ryan & Deci, 2002). The most self-determined form of motivation, or *behavioural regulation*, is intrinsic motivation, which refers to engaging in an activity for the pleasure and satisfaction derived from doing the activity for its own sake (Deci, 1971). Extrinsic motives or regulations focus less on the behaviour and more on outcomes that are distinct from the behaviour itself. SDT also explains how social factors like the actions of, and language used by, social agents in the environment impact on motivation through the mediating variables of competence, autonomy, and relatedness (Deci & Ryan, 1985; Vallerand, 1997). Several studies carried out in sport and educational contexts have highlighted the strong association between intrinsic motivation and positive cognitive, affective, and behavioural consequences (e.g., persistence, effort, concentration) (Deci & Ryan, 1991; Reeve, 2002; Ryan & Deci, 2000; Vallerand, Fortier, & Guay, 1997). For instance, dropout might be considered a maladaptive behavioural consequence that due to sport participants experiencing non-self-determined forms of motivation, whereas persistence with behaviour is presumed to be an adaptive outcome derived from self-determined forms of motivation (Boiché & Sarrazin, 2007; Pelletier et al., 2001, Sarrazin et al., 2002). In addition, Standage, Duda, and Ntoumanis (2005) showed that satisfaction of psychological needs is more strongly related to intrinsic motivation than other forms of behavioural regulation. Taken together, intrinsic motivation has been showed to be the leading predictor of sport performance and persistence in many studies, and therefore, it should be considered a focal variable when examining the organismic factors that affect sport behaviour.

Both theories emphasize the role of social factors as antecedents of achievement-related behaviour. Deci and Ryan (2000) have pointed out that social environments created by social agents in which normative comparisons predominate and rewards are provided contingent on performance tend to thwart intrinsic motivation. In contrast, environments that promote choice and self-mastery tend to nurture intrinsic motivation. Several studies have shown a positive effect of social environments created by social agents that are perceived as task-involving, known as *motivational climate*, on intrinsic motivation and negative effect of a climate perceived to be ego-involving on intrinsic motivation (Duda, 2001; Duda & Hall, 2000; Ntoumanis & Biddle, 1999). However, in these studies motivational climate has been studied with reference to the social psychological environment with leaders as the social agents. To date, few studies have examined the effects of social environments created by peers or co-workers.

Based on SDT tenets, Vallerand (1997) produced a motivational sequence ("Social factors → Psychological Mediators → Motivation → Consequence") in which the different motivational types are influenced by social environmental factors that either support or thwart motivation. The influence of these factors is exerted through the satisfaction of basic psychological needs. The last stage of this model refers to the cognitive, affective, and behavioural (e.g., persistence at a particular activity) consequences of different motivational types. According to Vallerand's (1997) model, the impact of social factors on motivation is mediated by athletes' satisfaction of three psychological needs; needs for autonomy, competence, and relatedness. The need for autonomy reflects an individual's need to experience opportunities for choice and self-actualisation as opposed to feeling controlled and pressured others. The need for competence reflects an individual's need to feel that they have adequate capability to carry out their actions. Finally, the need for relatedness indicates the desire to feel involved or have a sense of belongingness to others. Ryan and Deci (2000, 2002) have noted that a motivational climate that supports

psychological needs is likely to develop individuals' intrinsic motivation towards activities. If young athletes perceive that the motivational climate provided by peers supports self-referenced criteria for acting then it is likely that their need for competence will be satisfied. Furthermore, if the climate fosters athletes' propensity to make personal choices with respect to their activity it is likely that their need for autonomy will be supported. Finally, if athletes feel that the motivational climate supports cooperation among athletes in a team and allows them to contribute to the group's decisions, then their needs for relatedness will be supported. This is consistent with a previous study which demonstrated that a task-involving peer motivational climate satisfies the needs for autonomy, competence, and relatedness, and that such a climate also promoted self-determined motivation, whereas an ego-involving climate failed to satisfy these needs (Moreno, San Roman, Galiano, Alonso, & Gonzalez-Cutre, 2008).

### Previous studies

Several previous studies in the sport domain have indicated that peers are also important contributors along with adults in creating a motivational climate in sport settings (Cervelló et al., 2007; Ntoumanis & Vazou, 2005; Ullrich-French & Smith, 2006; Vazou, Ntoumanis, & Duda, 2006). Specifically, Cervelló et al.'s (2007) study confirmed the importance of significant others in the process of dropout behaviour and that a task orientation is associated with more positive motivational, affective, and behavioural patterns than an ego orientation. Furthermore, a recent study by Moreno et al. (2008) indicated that a motivational climate in which the peers were supportive and emphasized personal improvement, cooperation, and effort (task climate) influenced positive affective responses to sport via the mediation of variables like satisfaction of the needs for autonomy, competence, and relatedness, and self-determined motivation. Although Moreno et al. (2008) investigated how peer-created motivational climate is related to each of the three perceived psychological need satisfaction variables, there is, as yet, no evidence how these three needs mediate the relationships between peer motivational climate and athletes' motivation and persistence behaviour in sport.

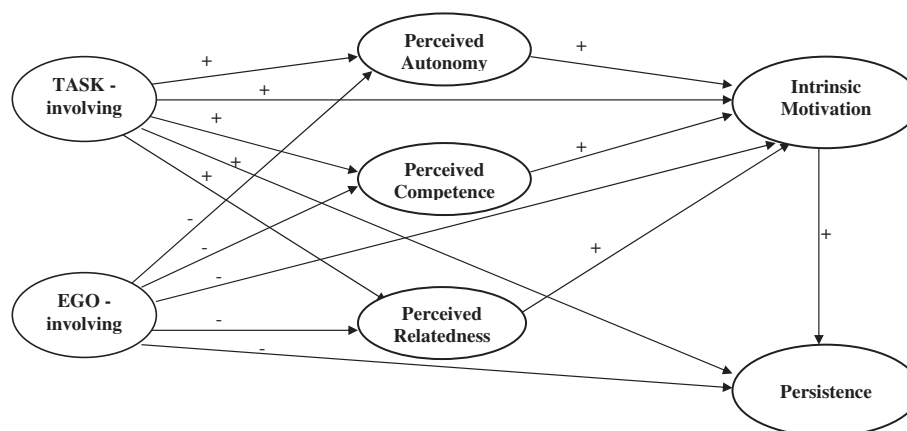
Some previous studies have also investigated differences between persistence and dropout among young athletes with respect to different motivation types, motivational climate, and psychological needs (Pelletier et al., 2001; Sarrazin et al., 2002). Sarrazin et al. (2002) showed that young athletes that dropped out

of sport perceived the training climate fostered by the coach less task-involving and more ego-involving than athletes who continued their sport participation. However, whether the perception of the motivational climate created by the peers is different among young athletes that persist and those that dropout of sport is not clear.

### The present study

While previous motivational models have identified social factors like autonomy support from adult social agents as important influences on athletes' motivation and persistence in sport, the role of peer-created motivational climate is still a relatively unexplored social-contextual factor. Therefore, the aim of the present study is to resolve this issue by examining the role of peer-created motivational climate in place of adult leader-created (i.e., the coach) motivational climate. The second purpose of the present study was to test a motivational model of sport persistence that integrates a four-stage causal sequence proposed by Sarrazin et al. (2002), based on the tenets of Vallerand's (1997) model ("Social factors → Psychological Mediators → Motivation → Consequence") and elements of AGT (Nicholls, 1989). The proposed motivational model to be tested is presented in Fig. 1. We hypothesized that peer motivational climate would influence athletes' perception of need satisfaction for competence, relatedness, and autonomy. Specifically, task-involving peer motivational climate was expected to be positively related, and ego-involving climate negatively related, to perceived competence, relatedness, and autonomy need satisfaction. We also expected that the persistent athletes should perceive the peer-created motivational climate as more task-involving, feel more intrinsically motivated, and feel that their perceived needs for autonomy, competence, and relatedness were satisfied, compared with athletes that dropped out of sport.

Consistent with the proposed four-stage causal sequence, it was also hypothesized that the influence of task- and ego-involving peer motivational climate on athletes' intrinsic motivation would be mediated by basic psychological needs. Overall, in accordance with the motivational model of persistence in sport that integrates the four-stage causal sequence and elements from AGT, we hypothesized that there would be a significant overall indirect effect of dimensions of peer motivational climate on persistence in sport via the mediation of psychological needs and intrinsic motivation. The overall effect was expected to be indirect through mediation of the constructs of the proposed motivational model.



**Fig. 1.** Hypothesized model. Notes: Task-involving - perceived task-involving motivational climate of peers; Ego-involving - perceived ego-involving motivational climate of peers; Perceived Autonomy - perceived autonomy need satisfaction; Perceived Competence - perceived competence need satisfaction; Perceived Relatedness - perceived relatedness need satisfaction.

## Method

### Participants

The sample comprised young athletes ( $N = 424$ ,  $M_{\text{age}} = 13.19$ ;  $SD = 1.56$ , range = 11–16 years) from different team-sport clubs in Estonia (48% basketball; 29% soccer; 23% volleyball). The participants were not elite athletes and were competitive only at the provincial level. Participants attended training sessions voluntarily and had been engaged with their team for at least a year ( $M = 3.61$  years,  $SD = 2.03$ ).

### Design and procedure

The study adopted a prospective design over the course of one year with initial psychological measures taken at the commencement of the study and behavioural data taken over the course of a year. Prior permission to conduct the study in each club was elicited from club coaches. At the initial time point, questionnaires containing psychological measures were completed by participants before a training session in the absence of the coach. It was emphasized that the purpose of the questionnaire was to measure athletes' general feelings about the training climate at the club. Participants were informed prior to data collection that the anonymity and confidentiality of their answers would be preserved at all times. Participation was voluntary and all institutional ethical data collection procedures (institutional approval, parent and coach consent and participant assent) were followed. Behavioural data were taken from attendance records kept over the period of one year after initial psychological data was taken. The study protocol received approval from the Institutional Review Board of the University of [location omitted for purposes of masked review].

### Measures

#### Peer-created motivational climate

Athletes' perceptions of the peer-created motivational climate in their training group were assessed using the Peer Motivational Climate in Youth Sport Questionnaire (PeerMCYSQ; Ntoumanis & Vazou, 2005). The questionnaire included 21 items to measure ego-involving and task-involving factors. Athletes responded to a common stem ("In this team/training group, most athletes...") and were asked to choose to what extent they agreed or disagreed with each item using seven-point response scales anchored by 1 (strongly disagree) and 7 (strongly agree). Examples of items forming the ego-involving climate factor are: "...try to do better than their teammates" (Intra-team Competition/Ability) and "...laugh at their teammates when they make mistakes" (Intra-team Conflict). Examples of items forming the task-involving climate factor are "...work together to improve the skills they do not do well" (Improvement), "...make their teammates feel valued" (Relatedness/Support), and "...encourage their teammates to keep trying after they make a mistake" (Effort). Cronbach alpha reliability coefficients were satisfactory for the factors Improvement ( $\alpha = .73$ ), Relatedness/Support ( $\alpha = .72$ ), Effort ( $\alpha = .80$ ), Intra-team Conflict ( $\alpha = .75$ ). The reliability for the Intra-team Competition/Ability ( $\alpha = .43$ ) was less than satisfactory and any data related to this factor should be treated with caution.

#### Basic psychological needs

The Basic Psychological Needs in Exercise Scale (BPNES; Vlachopoulos & Michailidou, 2006) was used to assess athletes' perceptions of the extent to which the needs for autonomy, competence, and relatedness were satisfied in the training group.

The autonomy subscale assesses the degree to which respondents perceive they have choice over their behaviour (e.g., "The exercise program I follow is highly compatible with my choices and interests"). The competence subscale asked respondents to indicate how they felt about their capacity to engage in exercise (e.g., "I feel that exercise is an activity in which I do very well"). The relatedness subscale assesses respondents' relationships with the members of their sport team (e.g., "I feel that I associate with the other exercise participants in very friendly way"). The questionnaire included 12 items (four items in each subscale) and response options for each item ranged from 1 (not at all true for me) to 4 (completely true for me), and are scored on a five-point scale, with higher scores reflecting greater perceptions of basic psychological needs. The questionnaire was preceded by a brief description which qualified the terms used in the questionnaire for the young athlete sample. The passage indicated that "exercise" included athletes' sport involvement in their clubs and that "other exercise participants" included fellow teammates from their sport club.

#### Intrinsic motivation

To determine participants' intrinsic motivation towards their activity, the intrinsic motivation subscale to experience stimulation was employed from the Sport Motivation Scale (SMS; Pelletier et al., 1995). The athletes were asked how much they agreed or disagreed with the items based on the root question "Why do you practice your sport?" using a seven-point response format anchored by 1 (does not correspond at all) and 7 (corresponds exactly). An example item from the subscale was "...for the excitement I feel when I am really involved in the activity". Support for the validity and reliability of the intrinsic scales from SMS modified for physical education context was obtained in a previous study (Hein, Müür, & Koka, 2004). In the present study only intrinsic motivation was measured as the several studies have highlighted that it should be considered the focal variable when examining the organismic factors that affect sport behaviour.

#### Persistence

Behavioural persistence was assessed using the coding system developed by Pelletier et al. (2001). Participants who dropped out after initial data collection (collected in September) in the period from November to December were coded 1; those who dropped out in the period from January or February were coded 2; those who dropped out in the period March to April were coded 3; those who dropped out in the period May to June were coded 4; those who persisted all year were coded 5. Throughout these procedures, a total of 142 dropout cases were identified. The proportion of dropout cases was 33.5% (4.7% in the first code category, 4.5% in the second, 4.5% in the third, 19.8% in the fourth). The dropout rates were equally distributed among gender and different sport activities. Overall, 32.3% ( $n = 102$ ) male, and 37.0% ( $n = 40$ ) female participants dropped out of their sport training. With respect to different sport activities, 32.5% ( $n = 66$ ) of basketball players, 32.8% ( $n = 40$ ) of soccer players, and 36.4% ( $n = 36$ ) of volleyball players dropped out of their sport training.

#### Translation procedures

In order to construct the Estonian version of the questionnaire we used a standardized back-translation technique (Brislin, 1986). A bilingual interpreter initially translated the English version of the questionnaire into Estonian, and then an independent bilingual expert translated the items back into English. Second, the original English version was compared to the back-translated version and all errors and incongruences were identified. The back-translation comparison process was repeated until all the incongruences



were eliminated. The final version exhibited no contradictions with the original English version of the measures.

### Data analyses

We conducted a MANOVA to test for differences in mean scores on the two peer motivational climate subscales, the three psychological need satisfaction subscales, and the intrinsic motivation scale between participants who dropped out of their team and those that persisted. In the analyses, the psychological subscales were the dependent variables and persistence was the independent variable. In the event of a significant multivariate effect, univariate ANOVAs for each subscale were conducted to identify the location of the differences.

Following preliminary psychometric and descriptive analyses, the proposed motivational model was tested using the LISREL 8.8 statistical software and a maximum likelihood estimation method (Jöreskog, Sörbom, du Toit, & du Toit, 2001). According to the study hypotheses, a number of models were estimated: a series of confirmatory factor analytic (CFA) measurement models examining the factor structure of the measures and a series of structural equation models (SEM) examining the hypothesized relations between the study variables. To evaluate the adequacy of the measurement CFA and SEM models multiple recommended indices of model fit were adopted (Hu & Bentler, 1999): the chi-square statistic ( $\chi^2$ ), the comparative fit index (CFI), the non-normed fit index (NNFI), and the root mean square error of approximation (RMSEA).

## Results

### Preliminary analyses

Descriptive statistics, internal reliability scores, and correlations among the study variables are presented in Table 1. The MANOVA comparing mean differences between persistent and dropout athletes revealed a significant multivariate main effect (Wilks' Lambda = .96,  $F(6, 417) = 2.64, p < .05$ , partial eta squared = .04). Univariate follow-up tests revealed that persistent athletes were more intrinsically motivated ( $F(1, 422) = 8.29, p < .005$ , partial eta squared = .02) and reported higher levels on the task-involving perceived peer motivational climate ( $F(1, 422) = 4.97, p < .05$ , partial eta squared = .01) than those that dropped out. Persistent athletes also exhibited higher scores on the autonomy ( $F(1, 422) = 4.97, p < .05$ , partial eta squared = .01), competence ( $F(1, 422) = 8.95, p < .005$ , partial eta squared = .02), and relatedness ( $F(1, 422) = 10.91, p < .001$ , partial eta squared = .03) need satisfaction subscales compared to those that dropped out (Table 1). Means for both groups on the ego-involving peer climate were not significantly different.

**Table 1**  
Descriptive statistics, factor correlation among the study variables and mean comparisons for the persistent and dropout athletes on the two dimensions of peer motivational climate, the three psychological needs and the athletes' intrinsic motivation subscales.

| Variables                 | Mean | SD   | $\alpha$ | 1     | 2     | 3    | 4    | 5    | Persistent athletes<br>( $n = 282$ ) | Dropout athletes<br>( $n = 142$ ) | $t$      |
|---------------------------|------|------|----------|-------|-------|------|------|------|--------------------------------------|-----------------------------------|----------|
| Peer motivational climate |      |      |          |       |       |      |      |      |                                      |                                   |          |
| 1. Task-involving         | 5.32 | .85  | .89      | –     |       |      |      |      | 5.38 (.83)                           | 5.19 (.88)                        | 4.97**   |
| 2. Ego-involving          | 4.44 | .89  | .73      | –.57* | –     |      |      |      | 4.40 (.80)                           | 4.51 (.72)                        | 2.11     |
| Basic psychological needs |      |      |          |       |       |      |      |      |                                      |                                   |          |
| 3. Perceived autonomy     | 3.82 | .75  | .80      | .49*  | –.25* | –    |      |      | 3.88 (.75)                           | 3.70 (.75)                        | 4.97**   |
| 4. Perceived competence   | 3.81 | .66  | .73      | .42*  | –.30* | .70* | –    |      | 3.88 (.65)                           | 3.68 (.65)                        | 8.95***  |
| 5. Perceived relatedness  | 4.02 | .84  | .88      | .67*  | –.53* | .39* | .49* | –    | 4.11 (.80)                           | 3.83 (.90)                        | 10.91*** |
| 6. Intrinsic motivation   | 5.46 | 1.09 | .78      | .48*  | –.19* | .57* | .65* | .51* | 5.57 (1.07)                          | 5.25 (1.09)                       | 8.29***  |

Note. Numbers in parentheses are standard deviations.

\* $p < .01$ ; \*\* $p < .05$ ; \*\*\* $p < .005$ .

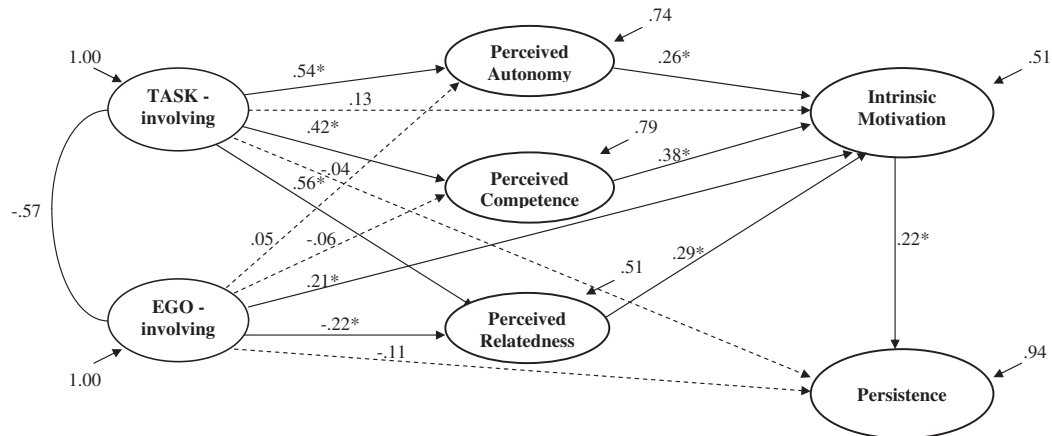
**Table 2**  
Goodness-of-fit statistics for confirmatory factor analysis and structural equation models.

| Models  | NNFI | CFI | RMSEA | CI <sub>95</sub> RMSEA | SB- $\chi^2$ (df) |
|---------|------|-----|-------|------------------------|-------------------|
| Model 1 | .99  | .99 | .034  | .024–.035              | 689.40 (467)      |
| Model 2 | .86  | .87 | .11   | .11–.11                | 2991.70 (495)     |
| Model 3 | .99  | .99 | .030  | .028–.039              | 598.04 (436)      |
| Model 4 | .98  | .98 | .040  | .036–.045              | 978.45 (579)      |
| Model 5 | .98  | .98 | .043  | .039–.047              | 1091.67 (615)     |

Note. Model 1 = discriminant validity CFA model with 8 factors and 33 items; Model 2 = congeneric model with 33 items; Model 3 = discriminant validity CFA model with 8 factors and 32 items; Model 4 = Measurement model with all study variable; Model 5 = Hypothesized structural equation model; NNFI = non-normed fit index; CFI = comparative fit index; RMSEA = root mean square error of approximation, CI<sub>95</sub> = 95% confidence interval; SB- $\chi^2$  = Sattora–Bentler scaled chi-square; df = Degrees of freedom.

Examination of skewness and kurtosis values of the items revealed that not all data were normally distributed. Kurtosis values ranged from –.93 to 2.72, whereas skewness values ranged from –1.36 to .96, which indicated that the variable distributions were outside the acceptable range between 0 and 1.00 (Muthén & Kaplan, 1985). To protect from departures from normality, the data were examined using robust maximum likelihood analysis with polychoric correlations for the measurement model and SEM analyses. In order to examine the hypothesized model, we followed Mulaik and Millsap's (2000) recommendations. First, a CFA model that assumed discriminant validity between items representing the three task-involving peer climate factors (Improvement with 4 items, Relatedness/Support with 3 items, and Effort with 5 items), two ego-involving peer climate factors (Intra-team Competition/Ability with 5 items and Intra-team Conflict with 4 items), and three factors of need satisfaction for autonomy, relatedness, and competence (4 items in each factor) was compared with a congeneric CFA model that assumed lack of discriminant validity for these constructs. Discriminant validity of the components is supported if the CFA model that hypothesizes discriminant validity satisfies the published cut-off criteria for indices of good fit and is superior in fit to the congeneric model. Second, the CFA was performed to verify the measurement model. Third, pending a satisfactory fit was obtained for the measurement model, we tested the proposed model relations using SEM.

First, the discriminant validity CFA model with eight-latent factors and 33 items met the published criteria for good fit and was superior in fit to the congeneric model (Table 2, Model 1 and Model 2, respectively). However, one item purported to be part of the Intra-team Competition/Ability subscale of the PeerMCYSQ ("In this team/training group, most athletes encourage each other to outplay their teammates") was associated with a very low factor loading. Inspection of the standardized residual matrix revealed that



**Fig. 2.** Structural Equation Model measuring the associations between the perceptions of motivational climate of peers, perceived autonomy need satisfaction, competence need satisfaction, and relatedness need satisfaction, intrinsic motivation and persistence behaviour in sport. Note: For clarity, the indicators of the latent factors were not included. \* $p < .01$ .

multiple large residuals were observed for this item (26 exceeding  $\pm 2.00$ ). Further, considering the large modification indices showed by the Lagrange Multiplier test for this item, it was removed and the data reanalysed. Goodness-of-fit indices for the 32-item eight-latent factor discriminant validity CFA model indicated adequate fit (Table 2, Model 3). Very high latent factor correlations between the task-involving factors (i.e., Improvement–Relatedness/Support,  $\phi = .93$ ; Relatedness/Support–Effort,  $\phi = .86$ ; Improvement–Effort,  $\phi = .88$ ) were observed. To reduce the possibility of multi-co-linearity and minimize the number of parameters in subsequent structural model, the items from the Improvement, Relatedness/Support, and Effort subscales of the PeerMCYSQ were combined to indicate a single task-involving factor and items from the Intra-team Competition/Ability and Intra-team Conflict subscales of the PeerMCYSQ were combined to indicate a single ego-involving factor. Combining these subscales due to the high intercorrelations has been adopted in previous studies (Moreno et al., 2008; Vazou et al., 2006).

Second, the postulated measurement model was based on 36 observed measures and six latent constructs, representing the integrated task-involving peer climate factors (comprising 12 items) and integrated ego-involving peer climate factors (comprising eight items), as predictors of the need satisfaction for autonomy, relatedness, and competence (comprising four items in each factor) factors and the intrinsic motivation factor (comprising four items). The latent factors were allowed to correlate freely during assessment of the measurement model (Anderson & Gerbing, 1988). The results from the CFA revealed that the measurement model was appropriate (Table 2, Model 4), where each factor was adequately explained by its respective set of indicator items.<sup>1</sup> In addition, factor correlations among the constructs were significantly different from unity according to the criteria specified by Bagozzi and Kimmel (1995), supporting the discriminant validity of the constructs.

#### Structural equation model

Having assessed the adequacy of the measurement models, we estimated a series of SEMs to test the hypothesized relations among our proposed theoretical model. The model included six latent

constructs. In the model, task- and ego-involving peer motivational climate factors were set as predictors of an intrinsic motivation factor via the mediation of three basic psychological needs satisfaction factors (autonomy, competence, and relatedness), and a single-indicator factor (the item error variance was fixed to 0) representing persistence in sport.

Examination of the fit indexes revealed that the proposed SEM reproduced the observed covariance matrix satisfactorily (Table 2, Model 5). Overall, the model accounted for 49% of the variance in intrinsic motivation and 6% of the variance in persistence. All estimated parameters were significant except for the direct effects of perception of task-involving peer motivational climate on intrinsic motivation and persistence; perception of ego-involving peer motivational climate on perceived autonomy need satisfaction, perceived competence need satisfaction and persistence (Fig. 2).

In line with the hypothesized model, the more the athletes perceived that the motivational climate fostered by their teammates emphasized task-involvement, the higher the level of autonomy need satisfaction ( $\gamma = .54, p < .01$ ), competence need satisfaction ( $\gamma = .42, p < .01$ ), and relatedness need satisfaction ( $\gamma = .56, p < .01$ ) they reported. In contrast, the more the athletes perceived the motivational climate to be ego-involved, the less relatedness need satisfaction ( $\gamma = -.22, p < .01$ ) they reported. Further, the more autonomous ( $\beta = .26, p < .01$ ), competent ( $\beta = .38, p < .01$ ), and related ( $\beta = .29, p < .01$ ) athletes felt, the more intrinsically motivated they were. Moreover, the intrinsic motivation significantly predicted actual persistence 12 months later ( $\beta = .22, p < .01$ ).

There was a significant total effect of task-involving peer motivational climate on intrinsic motivation ( $\beta = .57, p < .01$ ). The direct effect from task-involving peer motivational climate to intrinsic motivation was not significant ( $\beta = .13, p > .01$ ), but there was a significant indirect effect ( $\beta = .45, p < .01$ ). More specifically, according to the Sobel test (1982), task-involving peer motivational climate had positive, significant indirect effects on intrinsic motivation via the mediation of the perceived autonomy ( $\beta = .14, p < .01$ ), perceived competence ( $\beta = .16, p < .01$ ), and perceived relatedness ( $\beta = .15, p < .01$ ) need satisfaction constructs. This indicates that the influence of task-involving peer motivational climate on intrinsic motivation is mediated by all three need satisfaction constructs as hypothesized. Thus, satisfaction of the need for perceived autonomy, competence, and relatedness have a relatively equal role in the mediation of the relationship between

<sup>1</sup> The factor loadings and solution estimates from CFA are available upon request from the first author.

task-involving climate and intrinsic motivation. Results also revealed a significant indirect effect of task-involving peer motivational climate on persistence behaviour in sport ( $\beta = .13, p < .01$ ). In contrast, there were no significant total or indirect effects of ego-involving climate on intrinsic motivation and persistence. However, a small but significant negative indirect effect from ego-involving climate on intrinsic motivation via the mediation of perceived relatedness need satisfaction was found ( $\beta = -.06, p < .01$ ). The pattern of effects from this model suggested that task-oriented of peer motivational climate was the most important distal predictor of intrinsic motivation and persistence.

## Discussion

The purpose of this research was to gain better knowledge of the influence of dimensions of peer motivational climate and basic psychological needs on intrinsic motivation and, in turn, persistence behaviour in sport. As hypothesized, athletes that persisted in sport rated perceptions of task-involving peer climate, perceived psychological need satisfaction, and intrinsic motivation more highly than dropout athletes.

We hypothesized that the task-involving dimension of peer climate would significantly and positively predict athletes' psychological need satisfaction. Analogously, we also expected that the ego-involving dimension of peer climate would negatively predict psychological need satisfaction. Results showed that the task-involving peer motivational climate dimension significantly and positively predicted the perceived relatedness, autonomy, and competence need satisfaction constructs supporting this hypothesis. In contrast, the ego-involving dimension significantly and negatively predicted perceived relatedness need satisfaction and had no significant effect on the perceived autonomy and perceived competence need satisfaction constructs, which is also consistent with our hypotheses.

These results corroborate the findings obtained in previous studies with respect to coach-created motivational climate which showed that task-involving motivational climate positively influences the three basic needs satisfaction variables while an ego-involving climate tends to be unrelated or negatively related to these needs (Ntoumanis & Biddle, 1999; Reinboth & Duda, 2006; Sarrazin et al., 2002). In addition, previous research has demonstrated that task-involving coach and peer climate have significant and positive effects on psychological need satisfaction variables, particularly relatedness need satisfaction (Moreno et al., 2008; Sarrazin et al., 2002). In addition, Reinboth and Duda (2006) found that coach-created ego-involving motivational climate was the only significant negative predictor of perceived relatedness need satisfaction. Aligned with these results, our findings indicate that the task-involving dimensions for peers mirrors that of coaches and maximizes opportunities for athletes to feel that their needs for relatedness, autonomy, and competence are satisfied. Such satisfaction likely occurs if the athlete senses that everyone on the training group has an important role and their teammates emphasize cooperation, personal improvement, and sustained effort. In contrast, an ego-involving motivational climate undermines athletes' perceptions of relatedness need satisfaction if, for example, they sense conflict among team members. We also suppose that athletes' who perceive the climate to be ego-involving will feel competent and autonomous as long as they feel related with the others in the training group.

We also hypothesized that the satisfaction of basic psychological needs would mediate the influence of peer motivational climate on intrinsic motivation. The significant indirect effects from the dimensions of peer motivational climate on intrinsic motivation via the need satisfaction variables confirmed this hypothesis.

Specifically, perceived need satisfaction of autonomy, competence, and relatedness mediated the effect of task-involving peer climate on intrinsic motivation. In addition, the effects of both dimensions of peer climate on intrinsic motivation were indirect via perceived relatedness need satisfaction. However, the indirect effect from ego-involving climate on intrinsic motivation via perceived relatedness need satisfaction was negative and comparatively small in magnitude. Therefore, when young athletes perceive peer motivational climate to be more task-involving then the needs for competence, autonomy, and relatedness are more likely to be satisfied which, in turn, positively influences their intrinsic desire to engage with the activity. To some extent this is consistent with previous research that has highlighted the mediation of the effect of adult-created (e.g., teachers, coaches, and parents) motivational climate and intrinsic motivation by perceived autonomy, competence (Blanchard & Vallerand, 1996; Reeve & Deci, 1996; Vallerand et al., 1997), and relatedness (Blanchard & Vallerand, 1996) constructs. This study is one of the first to provide support that peer motivational climate influences athletes' intrinsic motivation indirectly via the mediation of basic psychological needs. Further studies should augment these findings by examining effects of adult-created (e.g., coaches, parents, teachers) motivational climate alongside the peer-created motivational climate on intrinsic motivation and other behavioural regulations from SDT.

In addition, we hypothesized that there would be a significant overall indirect effect of peer motivational climate on persistence in sport via the four-stage causal sequence. Results partially corroborated the first part of this hypothesis in which peer motivational climate predicted the three basic psychological need variables. Further, in accordance with SDT (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000, 2002), basic psychological need satisfaction positively predicted intrinsic motivation. Thus, when athletes feel that their needs for autonomy, competence, and relatedness have been satisfied they will participate in activity for autonomous reasons rather than for controlling reasons. Although, several studies have highlighted that autonomy is the most fundamental need satisfaction construct, and the satisfaction of the needs for competence and relatedness more peripheral, when it comes to predicting self-determined motivation (Hollembeak & Amorose, 2005; Kipp & Amorose, 2008; Sarrazin et al., 2002), our results showed that satisfaction of the needs for competence and relatedness emerged as more predictive of intrinsic motivation than autonomy need satisfaction. A possible reason for this is that these three influences are dependent on the individual needs, the nature of the activity, and the condition in which activity is performed (Vallerand, 1997).

The final point to support this final hypothesis is that our results showed that intrinsic motivation positively predicted persistence in sport. This finding corroborates previous results with respect to dropout in sport settings (Sarrazin et al., 2002). In addition, these results are in consistent with much of the research over the past two decades, which has demonstrated that self-determined types of motivation lead to adaptive outcomes (Moreno et al., 2008; Vallerand, 1997; Vallerand & Ratelle, 2002; Weiss & Ferrer-Caja, 2002). Additionally, studies on motives for participating in sport have shown that factors related to intrinsic motivation are also associated with sport involvement (Gould, 1987; Weiss & Chaumeton, 1992).

## Limitations and future directions

In spite of the important role of peer motivational climate on intrinsic motivation and sport persistence among young athletes identified in the present study, there are limitations associated with this work. First, the study was conducted on a sample of young athletes aged 11–16 years. Further replication of this model using

different age groups and target population is warranted. Second, this study was limited to team-sport athletes of different competitive standards. The extent to which these results generalize to individuals from different cultures (Hagger, Biddle, Chow, Stambulova, & Kavussanu, 2003; Hagger, Chatzisarantis, et al., 2009; Hagger, Wood, et al., 2009) or competitive standards (e.g., elite, novice or casual sport participants; Balaguer, Duda, Atienza, & Mayo, 2002), is unknown and should be empirically determined. A third limitation pertains to the fact that the overall training climate is sufficiently unstable over the season. Thus, further research should control for the covariance stability of the psychological measures. Finally, in this study intrinsic motivation predicted only 6% of the variance in actual behavioural persistence. The reason for this may be that persistence was not totally under the athletes' control. There may be other external regulators, such as different kinds of rewards, which may determine the athletes' behaviour. Thus, a fourth limitation is that this study was limited to the influence of peer motivational climate via the mediation of need satisfaction and intrinsic motivation only on persistence behaviour in sport. Also the limitation of the study is related with the fact that we did not measure the mediating role of needs satisfaction for the relationship between persistence behaviour and other variables like competence. The extension of the model through the inclusion of other reasons for dropout (e.g., injury, financial obligations, personality, and other motivational regulations) may help to provide a more complete understanding of the motivational processes predicting persistence behaviour in sport.

In summary, our findings are consistent with the premises of SDT and AGT as the guiding theoretical frameworks adopted to understand the processes underpinning the dropout or persistence behaviour in sport with respect to perceived peer motivational climate. More specifically, findings from this study corroborate the important role of the peer group as a source of influence on motivation and further behavioural persistence in sport. It seems that fostering a task-involving peer climate is efficacious in satisfying the three basic psychological needs from SDT. This will have a positive effect on intrinsic motivation for continuing participation in sport. This has important implications for interventions aimed at increasing athletes' self-determined motivation for participation using persuasive communication techniques (e.g., Chatzisarantis, Hagger, Smith, & Phoenix, 2004; Orbell & Hagger, 2006; Orbell et al., 2006). It is important for coaches to develop a task-involving peer climate and avoid promoting an ego-involving peer climate. Further research should examine the influence of coaches' behaviour on psychological needs and intrinsic motivation alongside peer motivational climate to better understand the processes related with sport persistence in young athletes.

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