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The effects of perceived peer motivational climate, autonomy support from coach, basic need satisfaction, and intrinsic motivation on persistence in sport



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LIST OF ORIGINAL PUBLICATIONS

This thesis is based on the papers listed below, which will be referred to in the following by their Roman numerals:

- I. Jõesaar, H., Hein, V., & Hagger, M. (2011). Peer influence on young athletes' need satisfaction, intrinsic motivation and persistence in sport: a 12-month prospective study. *Psychology of Sport and Exercise*, 12, 500–508.
- II. Jõesaar, H., Hein, V., & Hagger, M. (2012). Youth athletes' perception of autonomy support from the coach, peer motivational climate and intrinsic motivation in sport setting: one-year effects. *Psychology of Sport and Exercise*, 13, 257–262.
- III. Jõesaar, H.; Hein, V. (2011). Psychosocial determinants of young athletes' continued participation over time. *Perceptual and Motor Skills*, 113(1), 55–66.

Paper I, II and III. Helen Jõesaar had primary responsibility for leading the design of the study, coordinating and participating in data collection, making statistical analyses, and writing the manuscripts.

I. INTRODUCTION

Sport is a prominent feature in young people's lives (Smoll & Smith, 2002). The benefit of physical activity is frequently linked to psychological and physical health (Fox, Boutcher, Faulkner, & Biddle, 2000; Landers & Arent, 2001). A large number of children and adolescents regularly engage in organized sport programs (Ewing & Seefeldt, 2002). This mass involvement, however, masks high rates of dropout from sport often observed in children and young people (Weiss & Ferrer-Caja, 2002). 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). There is no single reason for the decision to discontinue participation in sport or physical activity. Previous research on youth sport dropout has typically employed motivational theories to investigate the various factors related to participation decisions (Bars, Gernigon, & Ninot, 2009; Cervelló, Escartí, & Guzmán, 2007; Fraser-Thomas, Côté, & Deakin, 2008; Gould, Feltz, Horn, & Weiss, 1982; Le Bars, Gernigon, & Ninot, 2009; Gould, 1987; Pelletier, Fortier, Vallerand, & Brière, 2001; 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 (Pelletier et al., 2001; Petlichkoff, 1993; Sarrazin et al., 2002; Weiss & Petlichkoff, 1989; Weiss & Williams, 2004). Despite research demonstrating the impact of social agents like adults in shaping athletes' motivation and persistence behaviour in sport, comparatively little research has investigated the influence of perceptions regarding the role of peers (Brustad & Partridge, 2002; Hagger & Chatzisarantis, 2009; Ullrich-French, & Smith, 2006) in predicting young athletes' participation motivation, which is relatively independent of adult influence (Ntoumanis, Vazou, & Duda, 2007). Therefore, one of the purposes was to test the validity of the peer motivational climate questionnaire (PeerMCYSQ; Ntoumanis & Vazou, 2005) among Estonian young athletes.

The main objective of the present study was to examine different social-contextual factors that influence youth athletes' participation motivation and persistence behaviour in sport. Therefore, two motivational models that incorporate the components of self-determination theory (Deci & Ryan, 1985; 2000) and achievement goal theory (Nicholls, 1989) have proposed. The motivational model of persistence proposes a prospective motivational sequence that begins with peer motivational climate and its influence on basic psychological needs, which in turn influence persistence behaviour in sport via

athletes' intrinsic motivation toward sport. The second prospective longitudinal model was proposed to examine temporal stability and cross-lagged relationships among perceived autonomy support from the coach, task-involving peer motivational climates, and athletes' intrinsic motivation toward sport.

Also, in this study the differences in perceptions of multiple psychological and motivational variables between the participants who dropped out and those who persisted, and with different amounts of experience in training were investigated.

2. REVIEW OF LITERATURE

2.1. Theoretical framework

Self-determination theory (Deci & Ryan, 1985, Ryan & Deci, 2000) and achievement goal theory (Nicholls, 1989) serve as the theoretical framework for the current research. The advantages of integrating theories to promote complementarity and reduce redundancy are well-documented and integrated models may offer a more parsimonious, comprehensive explanation of sport and exercise-related behaviour (Hagger, 2009; Orbell, Hagger, Brown, & Tidy, 2006).

A primary premise behind the integration of achievement goal theory (Nicholls, 1989) and self-determination theory (Deci & Ryan, 1985) is that both social cognitive theories of motivation emphasize the role of social factors as antecedents of achievement-related behaviour (Ntoumanis, 2001). Specifically, self-determination theory was developed to explain how human and non-human factors in social environments (Vallerand, 1997) affect on human motivation through basic psychological needs. Achievement goal theory posits how perception of motivational climates created by significant others interact with dispositional goals to influence cognition, affect, and behaviour in achievement context.

Based on self-determination theory, 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.

2.2. Self-determination theory and model of motivation

Central to self-determination theory is specifying the individuals' reasons or motives for participating in an activity that associate with different types of motivation. Each type of motivation reflects a qualitatively different reason for the behaviour in a given context, and can be organized along a continuum of self-determined behaviour that includes intrinsic and extrinsic types of motivation, and amotivation (Deci & Ryan, 1985, 2000). Self-determination theory focuses on the extent to which these motivations within the continuum are perceived as autonomous, controlling, or amotivating (Ryan & Deci, 2002). Autonomy implies the self-endorsement or self-initiation of one's behaviour. The most self-determined form of motivation 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). Vallerand et al. (1992)

differentiated three types of intrinsic motivation: intrinsic motivation to know, intrinsic motivation to accomplish, and intrinsic motivation to experience stimulation. Intrinsic motivation to know involves engaging in sport for the pleasure and satisfaction that one experiences while learning or trying something new. Intrinsic motivation to accomplish results as practicing a sport for the pleasure of outdoing oneself and the process of trying to reach new personal objectives. Finally, intrinsic motivation to experience stimulation refers to engaging in sport in order to experience the pleasant sensations derived from the activity itself. The sense of intrinsic types of motivation is represented by satisfaction, enjoyment, interest, and a cognition of choice. According to Deci and Ryan (1985), behaviours of significant others (e.g., opportunities for self-direction, choice, acknowledgement of feelings), that allow people to sense a greater feeling of autonomy, enhances individuals' intrinsic motivation.

Extrinsic motivation, in contrast, is considered controlling in nature and focuses less on the behaviour and more on outcomes that are distinct from the behaviour itself, and lies on the opposite pole to intrinsic motivation on the continuum of self-determination. Three major types of extrinsic motivation have been determined (Ryan, Connell, & Grolnick, 1990): identified regulation (which is shown when individuals value the activity), introjected regulation (which is motivation to engage in behaviours to avoid guilt, or to seek self-and other-approval) and external regulation (which is motivation to engage in behaviours controlled by rewards). Externally-regulated behaviours, that are less autonomous, are perceived by people as deriving from outside both the person and the self (Deci, Eghrari, Patrick, & Leone, 1994). Such behaviours are attained to satisfy a reward potentiality or external demand. Externally regulated individuals tend to engage in behaviours due to external reinforcement, generally as long as the reinforcing factors are present. At the other end of the self-determination continuum is amotivation, which refers to the state of lacking the intention to act (Ryan, 1995). Amotivated individuals are neither intrinsically nor extrinsically motivated and primarily the value of activity is neglected (Ryan, 1995).

Several previous studies have provided support that the five different types of motivation are organized in terms of extent to which the motivations are autonomous or emanate from the self and can directly predict a wide variety of behavioural, cognitive, and affective outcomes (e.g., persistence, effort, concentration) (Deci & Ryan, 1991; Reeve, 2002; Ryan & Deci, 2000; Vallerand, Fortier, & Guay, 1997). In addition, Vallerand (1997) noted that self-determined motivation regulations are related to more adaptive outcomes compared with less self-determined regulations or amotivation. Accordingly, intrinsic motivation and identified regulation, the most autonomous form of extrinsic motivation, are associated with greater engagement and persistence in task (Deci & Ryan, 2000). For instance, dropout might be considered a maladaptive behavioural consequence that due to sport participants experiencing non-self-determined forms of motivation, whereas persistence in 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). Taken together, intrinsic motivation has been shown to be the leading predictor of sport performance and persistence in many studies, and therefore, it should be considered a central variable when examining the organismic factors that affect sport behaviour.

In the context of self-determination theory, an athlete can sustain self-determined motivation only if psychological needs for autonomy, competence, and relatedness are satisfied (Deci & Ryan, 1991). The need for autonomy reflects an individual's need to experience opportunities for choice and self-actualization 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 (Deci & Ryan, 1985, 2000; Sheldon, Elliot, Kim, & Kasser, 2001). The extent of fulfilling or satisfying these needs determine the type of motivation, direction and persistence of an individual toward goal-directed behaviours (Vallerand, 1997). Behaviours that are performed for autonomous reasons (intrinsic motivation and identified regulation) satisfy psychological needs, and engaging in such behaviours will result in positive emotional and psychological outcomes such as persistence in sport activity. For example, Standage, Duda, and Ntoumanis (2005) showed that satisfaction of psychological needs is more strongly related to intrinsic motivation than other forms of behavioural regulation. On the contrary, perceptions of not meeting these three needs will facilitate non-self-determined forms of motivation and amotivation (Vallerand, 1997), which, in turn, may lead to dropping out of sport (Sarrazin, Vallerand, et al., 2002). Indeed, research corroborates the importance of the basic psychological needs for intrinsic and self-determined extrinsic motivation to continued participation (Sarrazin, Vallerand, et al., 2002; Reinboth, Duda, & Ntoumanis, 2004; Kipp & Amorose, 2008). These findings were supported by Guillet, Sarrazin, Carpenter, Trouilloud, and Curry (2002), who found that persisting female handball players perceived themselves as significantly more competent, more autonomous, and more connected to their team than did athletes who dropped out.

Self-determination theory also outlines how social agents can support or undermine individuals motivational processes (Deci & Ryan, 1991). Several studies in various life domains have indicated that a supportive, noncoercive climate promotes self-determined motivation (Grolnick, 2003; Soenens & Vansteenkiste, 2005). In addition, Reeve (2002) claimed that autonomy-supportive behaviour of supervisors is a highly effective motivational technique to facilitate motivation. Specifically, autonomy support considers the extent to which adults support athletes' freedom, encourage autonomy, and implicate individuals in decision processes (Mageau & Vallerand, 2003). The opposite of autonomy is control, as when a supervisor is directive, authoritarian, and punishing (Black & Deci, 2000). Autonomy support requires acknowledgement of others' perceptions, acceptance of others' feelings and the allowance of self-

initiated expression and action (Ryan & Solky, 1996). Significant others who are autonomy-supportive engage in behaviours that acknowledge their subordinates' thoughts and feelings, encourage choice, self-initiation and regulation of people's own behaviour, and minimize the use of pressure and demand to control others (Deci & Ryan, 1985, 1987).

In creating the autonomy-supportive environment in sports contexts, the coaches, as well as parents, play an important role. In sport domains, for example, a study by Amorose and Horn (2000) showed that college athletes who perceived their coaches as reflecting a leadership style that highlighted training and supervision, and was high in supportive behaviour and low in controlling behaviour, reported higher levels of autonomous motivation. Similarly, studies indicate that intrinsically motivated children perceived their parents to be autonomy-supportive, relative to controlling parents (Grolnick, Deci, & Ryan, 1997). Research based on self-determination theory has shown that perceived autonomy support from coaches or parents positively affects self-determined motivation, which in turn enhances participants' persistence in sport (Fortier, 2000; Pelletier et al., 2001; Gagne, Ryan, & Bargmann, 2003). For example, Gagne and colleagues (2003) found that gymnasts who perceived their coaches and parents to be autonomy supportive and involved in their participation generally reported higher self-determined motivation for gymnastics. In addition, several studies have shown that athletes who drop out perceived themselves as having less autonomy support from their coaches than persistent players (Pelletier et al., 2001; Guillet et al., 2002).

2.3. Achievement goal theory

Achievement goal theory (Nicholls, 1989) has also been widely used to study athletes' perceptions of the motivational climate operating in their sport setting. According to achievement goal theory (Ames, 1992; Nicholls, 1989) the social psychological environments that surround people may make them more, or less, concerned about improving task performance and making progress, proving their ability and avoiding being perceived as incompetent. Individuals in achievement settings may interpret their success with respect to two orientations, learning or task orientation and performance or ego orientation (Ames, 1992). 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 because the indicators of success on which they focus are internal and more controllable. Additionally, studies have shown that task orientation, or the sense of success when displaying task mastery, has been related to a host of adaptive outcomes such as increased positive affect, perceived effort, intrinsic motivation, and task persistence (Duda, Chi, Newton, Walling, & Catley, 1995; Ferrer-Caja & Weiss, 2000; Ntoumanis & Biddle, 1999; Sarrazin, Roberts, Cury, Biddle, & Famose, 2002). Individuals with a predominant ego orientation tend to interpret

success as performing well 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 simultaneously.

Supervisors who focus on learning, self-improvement, optimally challenging tasks, and effort create mastery or task-involving motivational climates. In contrast, supervisors who emphasize interpersonal competition, public evaluation, and normative feedback promote performance or ego-involving motivational climates. Research shows that athletes' perceptions of the motivational climate are related to various motivational outcomes (Ames & Archer, 1988; Amorose, 2007; Duda & Hall, 2001; Weiss & Ferrer-Caja, 2002). Perceptions of a task-involving climate positively predict indices of self-determined motivation, whereas perceptions of an ego-involving climate relate negatively to intrinsic motivation and positively to both amotivation and indices of extrinsic motivation (Goudas, 1998; Kavussanu & Roberts, 1996; Newton & Duda, 1999; Newton, Duda, & Yin, 2000; Petherick & Weigand, 2002; Seifriz, Duda, & Chi, 1992; Standage, Duda, & Ntoumanis, 2003; Theeboom, De Knop, & Weiss, 1995). Generally, studies that have addressed the relationships of motivational climate with dropping-out or persistence show that athletes who gave up their participation perceived the training climate to be ego-involved, whereas athletes who perceived a task-involving climate continued their participation in sport (Le Bars & Gernigon, 1998; Ntoumanis & Biddle, 1999; Sarrazin, Vallerand, et al., 2002).

Studies in youth sport contexts have generally focused on the role of the coaches in establishing the motivational climate (Newton et al., 2000; Sarrazin, Vallerand, et al., 2002; Seifriz et al., 1992; Walling, Duda, & Chi, 1993). However, it is important that the potential influence of peers is not neglected when considering determinants of the quality of young athletes' sport engagements. According to several authors (Evans & Roberts, 1987; Weiss, Smith, & Theeboom, 1996) peers can form opportunities for skill development and represent sources of validation, social support, and positive affect in achievement contexts. Pintrich, Conley and Kempler (2003) showed that interaction with peers, who may have a different approach from the supervisor toward engaging in the task, may impact on students' achievement goals. Such identification resulted in an increased informed interest in peer-created motivational climate within contexts of physical activity (Brustad, Babkes, & Smith, 2001; Brustad & Partidge, 2002; Smith, 2003).

Although a consistent association between motivational climate created by adults and different types of motivation has emerged in the extent literature (Cury et al., 1996; Goudas & Biddle, 1994; Ntoumanis, 2001; Standage et al., 2003), only a few studies have investigated how the perception of motivational climate created by peers is related to motivation and further participation behaviour (Carr, Weigand, & Hussey, 1999; Carr, Weigand, & Jones, 2000; Moreno, San Roman, Galiano, Alonso, & Gonzalez-Cutre, 2008). According to

their conceptualization, it is important to evaluate the effects of perceived motivational climate from both, adults and peers sources, in order to provide a comprehensive evaluation as to the factors that influence sport involvement in young people. In this respect, Ntoumanis and Vazou (2005) developed a valid instrument to measure peer motivational climate in youth sport (the PeerMCYSQ).

2.4. Peer created motivational climate

The peer motivational climate in youth sport questionnaire (PeerMCYSQ; Ntoumanis & Vazou, 2005) measures unique aspects of peer influence in creating a motivational climate in youth sport. The PeerMCYSQ includes 21 items modeling task-involving and ego-involving higher-order factors, which altogether include five lower-order factors (Improvement, Relatedness/Support, Effort, Intra-team Competition/Ability and Intra-team Conflict). More specifically, the task-involving factors are improvement (itemized as encouraging and providing feedback to teammates to improve), effort (measures the degree to which peers emphasize to their teammates that they should try their hardest), and relatedness/support (formulated as fostering the feeling of being part of team as well as the establishment of a friendly climate in the team). Ego-involving factor consisting of the sub-dimensions of intra-team conflict (destines to negative and unsupportive behaviours) and intra-team competition/ability (determines whether one's peers on the team underline social validation and acceptance through the demonstration of normative ability) (Ntoumanis & Vazou, 2005). PeerMCYSQ, developed by Ntoumanis and Vazou (2005), has acceptable factor structure and the reliability coefficients were largely satisfactory for all factors except for the intra-team competition/ability factor, whose coefficient was marginally acceptable (improvement $\alpha = .77$; relatedness/support $\alpha = .73$; effort $\alpha = .70$; intra-team competition/ability $\alpha = .69$; intra-team conflict $\alpha = .73$). Test-retest reliability of the questionnaire factors showed acceptable temporal stability over a 4-week period (improvement $R = .81$; relatedness/support $R = .77$; effort $R = .82$; intra-team competition/ability $R = .81$; intra-team conflict $R = .74$).

Previous research of peer influence, in terms of transmitting task-involving or ego-involving motivational climate cues, is rare. Carr and colleagues (Carr et al., 1999, 2000) have examined the peer motivational climate as well as the influence of parents, teachers, and sports heroes on children's achievement-related responses in physical education and sport. Their research showed that both adult- and peer-created climate may influence children's goal orientations, intrinsic motivation and perceptions of physical competence. These authors, however, assessed peer-created climate by rephrasing items from the PE Class Climate Scale (Biddle et al., 1995) and the Parental Initiated Motivational Climate Questionnaire-2 (White, 1996). As noted by Vazou, Ntoumanis, and Duda (2006), simply rewording the items of adult-focused climate question-

naires might not tap the unique aspects of peer influence experienced by young athletes. Recently, Vazou and colleagues (2006) examined the potential additive and interactive effects of the perceived coach- and peer-created motivational climate on affective and behavioural motivation-related variables in the youth sport setting. The results showed that enjoyment, measured by the subscale Interest-Enjoyment from Intrinsic Motivation Inventory (McAuley, Duncan, & Tammen, 1989), was positively predicted by both coach and peer task-involving motivational climate. Another study by Moreno and colleagues (2008), using nine items from the PeerMCYSQ, investigated the influence of motivational climate perceived by peers and psychological needs on self-determined motivation and enjoyment in exercise. They 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 et al., 2008). In addition, in youth sport, a study by Ntoumanis, Taylor, and Thøgersen-Ntoumani (2011) examined the concurrent predictive effects of coach and peer motivational climate on moral attitude, emotional well-being, and indices of behavioural investment over a 12-month period. Adopting a longitudinal perspective, the results indicate that perceptions of task-involving peer and coach climates were predictive of more adaptive outcomes than were perceptions of ego-involving peer and coach climates. The findings of these studies strengthen evidence for the relevance of peer-created motivational climate in youth sport along with the coach-created motivational climate. Despite these studies measuring peer-created motivational climate in respect to behavioural motivation-related variables, there is no evidence of how the dimensions of the PeerMCYSQ influence athletes' motivation for further participation behaviour in sport.

More recently, concern has also been raised as to how athletes' perceptions of the supportive behaviours of coaches could affect their social relationships with peers (Keegan, Harwood, Spray, & Lavallee, 2009; Ntoumanis & Vazou, 2005). Studies have shown that perceptions of coaches' behaviour in youth sport participation is just one part of the motivational climate in which activities take place (Conroy & Coatsworth, 2007). Keegan et al. (2009) indicated that there are a variety of conceptually and qualitatively distinct types of interactions between an athlete and their coach and/or peers, which is likely to be the result of a variety of possible social goals. The authors have noted that peer social relations among children are comparatively equal, whereas young athlete-coach relationships may often be characterized by an imbalance of power (Keegan et al., 2009). To attain coaches' approval, peers often transmit behaviours that are consistent with coaches' expectations (Vazou et al., 2006). Based on the tenets of self-determination theory (Deci & Ryan, 1985) and achievement goal theory (Nicholls, 1989), individuals may view social-contextual factors as precursors to the formation of motivational climate. Coaching behaviour, as one of the social factors which provides informational or task-involving feedback, leads to subsequent intrinsic motivation for sport participation (Ryan, 1982). Such types

of the behaviour may be perceived as autonomy-supportive and are inherent to task-involving climates (Nordin-Bates, Quested, Walker, & Redding, 2011). In line with self-determination theory, it is reasonable to propose that perceived autonomy support from the coach that fosters collaboration, improvement, and effort will play a role in shaping a task-involving peer motivational climate which, in turn, is likely to develop the athletes' intrinsic motivation toward activities. More precisely, the perceived behaviour of the athletes' coaches, which is directed toward improving skills to accomplishing tasks, will encourage athletes to try their hardest and to cooperate with team members. Additionally, over time, these relationships between athletes and coaches, as well as between peers, will give rise to the formation of stable and strong motivational climates. This, in turn, will lead to the development of intrinsic motivation, because an athlete invests time and effort in an activity to acquire the necessary skills for its own sake (Nicholls, 1989). Although Ames (1992) indicated that the behaviour of significant others has an impact to the formation of motivational climate, there is a lack of evidence of how coaches' behaviours might set the tone for peer interactions. Vazou et al. (2006) documented the notion that the behaviour of peers and coaches has a pervasive influence on team motivation and behavioural outcomes; however, there is limited evidence regarding the stability and interplay between the behaviours of coaches and peers over time. In addition, considering the very limited work that has investigated the role peer-created motivational climate on athletes' motivation to date, there is little evidence explaining how such a climate is created and how it develops over time (Ntoumanis & Vazou, 2005; Ntoumanis et al., 2007). Also, it is not clear whether perceived autonomy support from a coach predicts task-involving peer climate over time, or vice versa. Finally, to date, studies have examined the roles of social agents on continuation decisions in youth sport separately. Therefore, knowing more about the effect of social agents in combination with psychological and motivational determinants may help to identify options for enhancing sport continuation and the subsequent benefits among youth.

2.5. Previous empirical research with youth athletes' dropout from sport

Understanding persistence or dropout behaviour in youth sport has been the object of analyses within theories of motivation for the past four decades (Cervelló et al., 2007; Fraser-Thomas et al., 2008; Gould, 1987, Gould et al., 1982; Le Bars et al., 2009; Roberts, 1992, 2001). Within these previous studies, the dropout has been explained to be the end result of a lack of motivation (Gould, 1996). Therefore, many researchers have emphasized the importance of understanding the processes youth athletes may go through before they dropout from sport (Petlichkoff, 1993, Weiss & Petlichkoff, 1989, Weiss & Williams, 2004).

In a prospective study that lasted 21 months, Sarrazin et al. (2002) proposed the motivational model of sport dropout that integrates the four-stage causal sequence proposed by Vallerand (1997), and elements from achievement goal theory (Nicholls, 1989). In the model presented by Sarrazin et al. (2002) motivational climate emphasised by coach was viewed as social factor, and perceived competence, autonomy and relatedness as psychological mediators, which in turn determined the participants' motivation toward the sport and further the dropout or persistence behaviour. In their study with young handball female players, they found that the perception of a mastery climate is associated with persistence, whereas a competitive climate is associated with dropout. Additionally, the results showed that the perception of a task-involving motivational climate contributed to a higher perception of competence, and stronger feelings of autonomy and relatedness. Conversely, the perception of an ego-involving motivational climate was associated negatively with these basic psychological needs. Their results also revealed that a lack of autonomy and relatedness with others and feelings of low competence diminish self-determined motivation and finally contributes to dropout behaviour. Taken together, their model posits that intrinsically oriented athletes are motivated to persist in sport. On the whole, their results corroborate other researchers who have shown that engagement in activities for more self-determined reasons is associated with positive cognitive, affective, and behavioural outcomes (Ryan & Deci, 2002; Vallerand & Ratelle, 2002; Weiss & Ferrer-Caja, 2002).

Another motivational model, proposed by Pelletier et al. (2001), incorporates perception of coaches' interpersonal behaviours, five forms of self-determined regulations and persistence. Using a prospective three-wave design with competitive swimmers, the tests revealed that perception of coaches' autonomy supportive interpersonal behaviour fostered self-determined forms of regulation, whereas controlling behaviour was connected to non-self-determined motivation. In accordance with findings by Sarrazin and colleagues (2002), the results of this study showed that persistent athletes presented higher levels of self-determined forms of motivation toward swimming, which predicted engagement with an activity after a 10-month period and after 22-month period. In opposite took place for the non-self-determined forms of motivation at both measurement time.

Recently, Cervelló et al. (2007) investigated peer group influence on achievement motivation. They proposed a motivational model that integrated dispositional goal orientation; the perception of success criteria used by sport friends and coaches, and perceived personal ability to examine dropout behaviour. The results indicated that the perception of ego-orientated sport success criteria used by coaches predicted an ego orientation and ability. In addition, an ego orientation and the perception of ability positively predicted dropout behaviour. The results supported the importance of significant others in dropout behaviour, and that a task-orientation is associated with more positive motivational, affective, and behavioural patterns than an ego-orientation.

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, to resolve this issue the role of peer-created motivational climate in place of adult leader-created (i.e., the coach) motivational climate was investigated in the current study. The main purpose of the present study was to test the motivational model of sport persistence proposed by Sarrazin et al. (2002), based on a four-stage sequence model of Vallerand (1997) (Social factors → Psychological Mediators → Motivation → Consequence) in which peer motivational climate and perceived autonomy support from coach were viewed as social factors. According to self-determination theory tenets the motivational sequence indicates that the different motivation 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. 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. The proposed model will contribute to present knowledge by establishing how the peer motivational climate in sport context influences athletes' sport motivation and future persistence behaviour.

3. OBJECTIVES OF THE STUDY

The main objective of this study was to investigate the effects of the dimensions of peer-created environment, basic psychological needs, autonomy support from adults and types of motivation on persistence in youth sport.

In this study, it was hypothesized (H1) that the Peer Motivational Climate in Youth Sport Questionnaire and components of self-determination theory will exhibit appropriate fit and are valid to use among Estonian youth athletes. Based on self-determination theory and achievement goal theory, it was hypothesized (H2) that task-involving peer motivational climate is positively, and ego-involving climate negatively, related to perceived competence, relatedness, and autonomy need satisfaction. Consistent with the proposed four-stage causal sequence of the motivational model, it was also hypothesized (H3) 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 achievement goal theory, we hypothesized (H4) 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.

It was also anticipated (H5) that athletes' perception of peer motivational climate and autonomy support from their coach would exhibit a moderately high degree of stability. In addition, it was anticipated (H6) that, over time, perceived autonomy support from the coach would have a greater influence on task-involving peer motivational climate than motivational climate would have on autonomy support. It was also hypothesized (H7) that task-involving peer motivational climate and autonomy support from the coach would have direct and longitudinal effects on intrinsic motivation for sport participation.

It was hypothesized (H8) that the persistent athletes should perceive the peer-created motivational climate as more task-involving, perceive more autonomy support from coaches and parents, 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. It was also hypothesized (H9) that participants with up to one year in training would perceive less support from the peer motivational climate, less need satisfaction for autonomy, competence, and relatedness, and less sport motivation than participants with one to three years or more than three years in training.

The aims of the present study were:

1. To test the validity of the Peer Motivational Climate in Youth Sport Questionnaire among Estonian youth athletes;
2. To identify the effects of perceived peer motivational climate on athletes intrinsic motivation and persistence behaviour via the mediation of basic psychological needs;
3. To investigate the temporal stability of the perceived task-involving peer motivational climate and autonomy-support from the coach and the relationships between these variables on intrinsic motivation over an one-year period;
4. To examine the differences in psychological and motivational variables between persisted and dropout youth athletes and between groups with different years in training.

4. METHODS

4.1. Participants and research design

The participants of this study were recruited from different sports clubs and schools in Estonia. Athletes attended training sessions voluntarily and were involved in organized team and/or individual sports. The participants were not elite athletes and were competitive only at the national and/or provincial level.

In Paper I, the sample comprised young athletes ($N = 424$, M age = 13.19; $SD = 1.56$, range = 11–16 years) from different team-sport clubs (48% basketball; 29% soccer; 23% volleyball). Participants had been engaged with their team for at least a year ($M = 3.61$ years, $SD = 2.03$).

The study in Paper I 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. At the initial time point, youth athletes completed questionnaires containing measures of perceived autonomy support from coaches, peer motivational climate, basic psychological needs satisfaction, and intrinsic motivation for sport participation. Behavioural data were taken from attendance records kept over the period of one year after initial psychological data were taken.

In Paper II, the participants were 362 athletes (252 male and 110 female; M age = 13.10, $SD = 2.08$) between the ages of 11 to 16 years. These participants participated in both individual (swimming, badminton) and team (basketball, soccer, volleyball) sports.

The athletes completed the questionnaire on two occasions over a one-year period. The first time (Time 1), perceived autonomy support from the coach (Hagger et al., 2007) and perception of the peer-created climate (PeerMCYSQ; Ntoumanis & Vazou, 2005) were assessed. One year later (Time 2), these two measures were administered to the sample again along with measures of three types of intrinsic motivation for sport participation (SMS; Pelletier et al., 1995). Athletes were identified by date of birth. In every sports club, the same coach trained the athletes during the follow-up period.

In Paper III, the participants were 659 young athletes (429 male and 230 female) with ages ranging from 9 to 17 years (M age = 12.7, $SD = 1.7$). The sample included basketball (33.7%), volleyball (18.1%) and soccer players (20.3%), swimmers (12.3%), and badminton players (15.6%). Sport participation history ranged from 1 month to 5 years ($M = 2.38$, $SD = 1.65$).

Young athletes completed the questionnaires, measuring autonomy support from parents and coaches, peer motivational climate, basic psychological needs satisfaction, and sport motivation at the beginning of the training sessions. At 1 year and 2 years after the beginning of the study, coaches were contacted to identify athletes who continued participation in their training group. The selected sample included 339 dropouts (Dropout group: 206 male and 133 female) who did not practice the activity anymore and 320 persisting athletes (Persistent group: 223 male and 97 female) who continued their participation after the 2 year period.

4.2. Measures

In Paper I, athletes in the first wave completed the Peer Motivational Climate in Youth Sport Questionnaire (PeerMCYSQ; Ntoumanis & Vazou, 2005) to measure their perceptions of the peer-created motivational climate in their training group. 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...”) on 7-point Likert-type scales 1 (*strongly disagree*) to 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).

Athletes’ perceptions of autonomy, competence, and relatedness need satisfaction was assessed on 12-items from the Basic Psychological Needs in Exercise Scale (BPNES; Vlachopoulos & Michailidou, 2006). Response options for each item ranged from 1 (*not at all true for me*) to 5 (*completely true for me*), and are scored on a five-point scale, with higher scores reflecting greater perceptions of basic psychological needs. 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 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. To measure participants’ intrinsic motivation toward their activity, the intrinsic motivation subscale to experience stimulation was employed from the Sport Motivation Scale (SMS; Pelletier et al., 1995). Intrinsic motivation was measured via the common stem question: “Why do you participate in your sport?” followed by four reasons (e.g. “I participate because of the excitement I feel when I am really involved in the activity”). Responses were measured on a seven-point scale ranging from 1 (*does not correspond at all*) to 7 (*corresponds exactly*). 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.

In Paper II, the perceived task-involving peer motivational climate and perceived autonomy support from the coach were assessed in the first wave (Time 1) of collecting data. The perceived task-involving peer motivational climate was assessed by responses to the Peer Motivational Climate in Youth Sport Questionnaire (PeerMCYSQ; Ntoumanis & Vazou, 2005). Three factors task-involving subscale consisted of nine items, response options for each item ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). Perceived autonomy support from the coach was measured through short form of the Sport Climate Questionnaire (Hagger et al., 2007). Responses were made on a seven-point Likert-type scale with choices ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), with higher scores evidencing a more autonomy-supportive style. One year later (Time 2), these two measures were administered to the sample again along with measures of all three subscales of intrinsic motivation for sport participation from the Sport Motivation Scale (SMS; Pelletier et al., 1995).

In Paper III, youth athletes completed a questionnaire containing measures of autonomy support from parents and coaches, peer motivational climate, basic psychological needs satisfaction, and sport motivation. The items adopted from the Sport Climate Questionnaire (Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003) were used to measure participants' perceptions of the autonomy-supportive behaviour exhibited by their coaches and parents. The short version of the questionnaire with six items was used on a 7-point Likert-type scale anchored by 1 (*strongly disagree*) to 7 (*strongly agree*), with higher scores indicating a more autonomy-supportive style. An example item constituting the coaches' autonomy supportive scale included, "I feel that my coach provides me choices and options". Items comprising the parents' autonomy supportive scale included, "I feel understood by my parents regarding why I am active in sport." Peer-created motivational climate in their training groups was assessed through five subscales from the Peer Motivational Climate in Youth Sport Questionnaire (Ntoumanis & Vazou, 2005). Also, youth athletes' need satisfaction for autonomy, competence, and relatedness were assessed through The Basic Psychological Needs in Exercise Scale (Vlachopoulos & Michailidou, 2006). The questionnaire included 12 items (four in each subscale), and response were recorded on a 5-point Likert-type ranging from 1 (*not at all true for me*) to 5 (*completely true for me*). The Sport Motivation Scale (Pelletier et al., 1995) was designed to represent the self-determination continuum (Deci &

Ryan, 1985) and was used to assess individuals' motivation for sport participation. The study asked the participants how much they agreed with the items based on the root question "Why do you currently participate in sport?" The Sport Motivation Scale consisted of 28 items divided into seven subscales – amotivation, three types of extrinsic motivation (external, introjected, identified regulation), and three types of intrinsic motivation (to know, to accomplish, to experience stimulation). Response options were applied to a 7-point scale ranging from 1 (*does not correspond at all*) to 7 (*corresponds exactly*). To compare sport activity based on categories of sport continuation and years in training, participants were divided into two and three groups, respectively. Sport continuation was dummy coded so that athletes persisting in the training group (Persistent group) were assigned a "1," whereas those dropping out from the training group (Dropout group) were assigned a "0." According to the years in training, the athletes were divided into three groups: the first group with up to 1 year of training (Low training); the second group with 1 to 3 years of training (Middle training); and the third group with more than 3 years of training (High training).

4.3. Research procedure

In all cases, permission to conduct the studies in each club was elicited from club coaches. Participation was voluntary, they were informed about the instructions on how to fill in the questionnaire, and that the anonymity and confidentiality of their answers would be preserved at all times. The researchers emphasized to the participants that all the questionnaires were designed to measure athletes' own perceptions of the training climate at the club and that there were no right or wrong answers. The athletes completed the questionnaires before a training session in the absence of the coach and participants were separated so that they could not copy or discuss responses. The questionnaire took approximately 20-30 minutes to complete.

4.4. Translation procedures

To produce an Estonian version of the questionnaire, standardized back-translation techniques (Brislin, 1986) were used. First, a bilingual interpreter translated the English version of the questionnaire into Estonian, and then two independent bilingual interpreters translated the same items back into English. The original English version was then compared with the back-translated version and all errors and discrepancies were identified. The back-translation comparison process was repeated until all discrepancies were eliminated. The final version exhibited no contradictions with the original English version of the measures when back-translated.

4.5. Statistical analysis

The data analysis was performed using SPSS 13.0 and LISREL 8.8 computer programs. Descriptive statistics means (M), \pm standard deviation (SD), and Cronbach's alphas were calculated for all items to assess the internal reliability of the subscales. Pearson correlation analyses were calculated to examine relationships between study variables. A series of confirmatory factor analytic models were used to check the factorial validity of the scales for each study. Confirmatory factor analyses models tested the adequacy of the study measures in representing their associated hypothesized construct.

In Paper I, a multivariate analysis of variance (MANOVA) was used 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.

In Paper I and II, in order to examine the hypothesized models, Mulaik and Millsap's (2000) recommendations were followed. First, congeneric and discriminant validity models were estimated and compared with each other. Discriminant validity of the components is supported if the confirmatory factor analysis 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. According to the criteria specified by Bagozzi and Kimmel (1995), the discriminant validity of the constructs is supported if the correlations among the constructs are significantly different from unity. Second, the confirmatory factor analysis was performed to verify the measurement model. Third, structural equation modelling was used to test the validity of the motivational model of persistence in youth sport and longitudinal model of motivation.

To confirm the mediation of the effects of dimensions of peer motivational climate on persistence in sport via psychological needs satisfaction and intrinsic motivation (Paper I), a Sobel-test was conducted. The cross-lagged correlation was used in Paper II. Stability of task-involving peer motivational climate and autonomy support from coach was estimated by the Pearson correlation. To confirm the longitudinal effects of the perceived autonomy support from the coach and task-involving peer climate at Time 1 on intrinsic motivation at Time 2, both effects of social factors at Time 2 on intrinsic motivation were fixed to zero (Paper II). If the direct longitudinal coefficient in this restricted model was significant, then we have confirmation of the longitudinal direct effect of perceived autonomy support from the coach and task-involving peer climate on intrinsic motivation in youth sport.

To protect from departures from normality, all confirmatory factor analyses and structural equation modelling procedures were examined using maximum likelihood estimation method (Jöreskog, Sörbom, du Toit, & du Toit, 2001).

The adequacy of the confirmatory factor analyses and structural equation model was determined using recommended incremental goodness-of-fit indexes: comparative fit index (CFI), the non-normed fit index (NNFI), the root mean square error of approximation (RMSEA) and its 90% confidence intervals (90% CI). Cut-off values greater than .95 for CFI and NNFI and values equal to or less than .08 for RMSEA were considered acceptable (Hu & Bentler, 1999).

In Paper III a two-way multivariate analysis of variance (MANOVA) was conducted with univariate follow-up tests (ANOVA, Fisher's LSD *post hoc*) in which the significance level was adjusted for multiple comparisons. This was used to assess whether the groups of sport continuation and years in training differed significantly with regard to their perceptions of autonomy support from adults, peer motivational climate, psychological needs satisfaction, and sport motivation.

5. RESULTS

5.1. Validity and reliability of the measures and correlations between subscales (Paper I)

To test the validity of the PeerMCYSQ, confirmatory factor analysis model was conducted. To estimate the CFA model, 21-items from each source of peer motivation climate scale were set to load on their respective factors representing the Improvement (4 items), Relatedness/Support (3 items), Effort (5 items), Intra-team Competition/Ability (5 items), and Intra-team Conflict factor (4 items). CFA results showed a good fit ($\chi^2(179) = 366.99$; $p < .001$; $\chi^2/df = 2.05$; CFI = .98; NNFI = .98; RMSEA = .050; 90% CI of RMSEA = .042 to .057) for the 5-factor PeerMCYSQ model. Cronbach's alpha 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. The majority of subscales indicated coefficients greater than .70, indicating an acceptable level of consistency (Nunnally, 1978). As the confirmatory factor analyses models satisfied cutoff criteria for goodness-of-fit, it also supported the factor structure of the peer motivation climate scales.

Discriminant and congeneric models were estimated to demonstrate the discriminant validity of the dimensions of peer motivation climate and basic psychological need satisfaction factors. Confirmatory factor analysis model 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 confirmatory factor analysis model that assumed lack of discriminant validity for these constructs. In the congeneric model, all items from peer climate and need satisfaction scales were loaded on the same factor and did not differentiate between the sources. Discriminant validity of the components is supported if the confirmatory factor analysis 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. The discriminant validity of the confirmatory factor analysis model with eight-latent factors and 33 items met the published criteria for good fit (see Paper I, Table 2, Model 1) and was superior in fit to the congeneric model (see Paper I, Table 2, Model 2). One item in 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 multiple large residuals were observed for this item (26 exceeding ± 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 ($\chi^2(436) = 598.04$; $p < .001$; $\chi^2/df = 1.37$; CFI = .99; NNFI = .99; RMSEA = .030; 90% CI of RMSEA = .028 to .039).

Very high latent factor correlations between the task-involving factors (Table 1) 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.

Table 1. Intercorrelations between 5-factor peer motivational climate and 3-factor basic psychological need satisfaction

Factor correlations	1	2	3	4	5	6	7
1. Improvement							
2. Relatedness Support	.93*						
3. Effort	.88*	.86*					
4. Intra-team Competition Ability	.09	-.06	.22*				
5. Intra-team Conflict	-.60*	-.70*	-.50*	.44*			
6. Perceived Autonomy	.45*	.45*	.49*	.09	-.27*		
7. Perceived Competence	.37*	.44*	.40*	.08	-.32*	.69*	
8. Perceived Relatedness	.64*	.77*	.57*	-.02	-.55*	.39*	.49*

* $p < .01$

To estimate the constructs of hypothesised motivational model of persistence the confirmatory factor analyses was performed to verify the measurement model. 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 8 items), as predictors of the need satisfaction for autonomy, relatedness, and competence (comprising 4 items in each factor) factors and the intrinsic motivation factor (comprising 4 items). The latent factors were allowed to correlate freely during assessment of the measurement model (Anderson & Gerbing, 1988). 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. The goodness-of-fit indices of the measurement model was appropriate, where each factor was adequately explained by its respective set of indicator items (see Paper I, Table 2, Model 4).

Table 2 shows descriptive statistics and factor correlations of the measurement model of the persistence in youth sport constructs. Composite reliability coefficients were also largely satisfactory for these samples, exceeding the recommended .70 minimum (Nunnally, 1978).

Table 2. Descriptive statistics, Factor correlations for the latent variables from the measurement model.

Variables	Mean	SD	1	2	3	4	5
Peer motivational climate							
1. Task-involving	5.32	.85					
2. Ego-involving	4.44	.89	-.57*				
Basic psychological needs							
3. Perceived autonomy	3.82	.75	.49*	-.25*			
4. Perceived competence	3.81	.66	.42*	-.30*	.70*		
5. Perceived relatedness	4.02	.84	.67*	-.53*	.39*	.49*	
6. Intrinsic motivation	5.46	1.09	.48*	-.19*	.57*	.65*	.51*

Note. * $p < .01$

5.2. The motivational model of persistence in youth sport (Paper I)

Structural equation modelling was conducted to test the hypothesized relations among proposed theoretical model of persistence in youth sport. 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 (see Paper I, Figure 1). In addition, the model was constructed so that task-involving and ego-involving peer climate had direct effects on intrinsic motivation in sport and persistence behaviour. The goodness-of-fit indices of the proposed SEM were acceptable ($\chi^2(615) = 1091.67$, $p < .001$; $\chi^2/df = 1.78$; CFI = .98; NNFI = .98; RMSEA = .043; 90% CI of RMSEA = .039 to .047). Overall, 49% of the variance in intrinsic motivation and 6% of the variance in persistence were explained. 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 (Figure 1). The model demonstrated that 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 perceived basic need satisfaction for autonomy ($\beta = .26, p < .01$), competence ($\beta = .38, p < .01$), and relatedness ($\beta = .29, p < .01$) positively predicted youth athletes' intrinsic motivation. Moreover, the intrinsic motivation significantly predicted actual persistence 12 month 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 model supported the hypothesis that youth athletes' task-involving peer motivational climate indirectly effect their intrinsic motivation and persistence in sport via their perceived need satisfaction of autonomy ($\beta = .14, p < .01$), competence ($\beta = .16, p < .01$), and relatedness ($\beta = .15, p < .01$). Results also revealed a significant indirect effect of task-involving peer motivational climate on persistence behaviour in sport ($\beta = .13, p < .01$). In contrast, results showed that significant total and indirect effects of ego-involving climate on intrinsic motivation and persistence did not emerge. 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.

Finally, examination of the mean differences between persistent and dropout athletes revealed that persistent athletes were more intrinsically motivated and reported higher levels on the task-involving perceived peer motivational climate than those that dropped out. Persistent athletes also exhibited higher scores on the autonomy, competence, and relatedness need satisfaction subscales compared to those that dropped out (Table 3). Means for both groups on the ego-involving peer climate were not significantly different.

Table 3. 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	Persistent athletes (n = 282)	Dropout athletes (n = 142)	<i>t</i>
Peer motivational climate			
1. Task-involving	5.38 (.83)	5.19 (.88)	4.97**
2. Ego-involving	4.40 (.80)	4.51 (.72)	2.11
Basic psychological needs			
3. Perceived autonomy	3.88 (.75)	3.70 (.75)	4.97**
4. Perceived competence	3.88 (.65)	3.68 (.65)	8.95***
5. Perceived relatedness	4.11 (.80)	3.83 (.90)	10.91***
6. Intrinsic motivation	5.57 (1.07)	5.25 (1.09)	8.29***

Note. Numbers in parentheses are standard deviations.
** $p < .05$; *** $p < .005$.

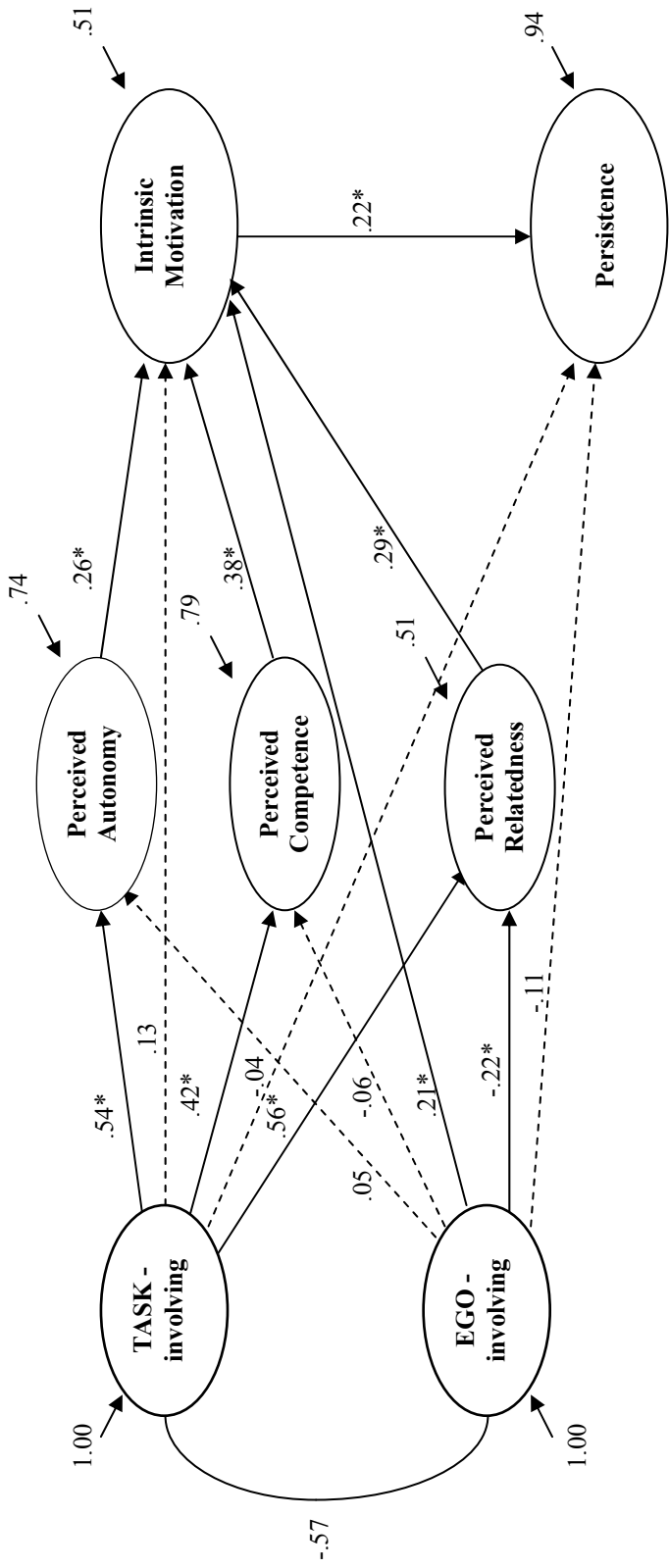


Figure 1. Structural Equation Model measuring the associations between the perceptions of motivational climate of peers, perceived autonomy need satisfaction, competence need satisfaction, and relatedness need satisfaction, intrinsic motivation, and persistence behaviour in sport.

5.3. Temporal stability and the relationships of perceived autonomy support from the coach and peer motivational climate, and intrinsic motivation over a year (Paper II)

Table 4 shows descriptive statistics for the items of perceived autonomy support from the coach, task-involving motivational climate of peers, and intrinsic motivation in sport over a training year.

Table 4. Descriptive statistics, Factor correlations for the latent variables for Time 1 and Time 2 data collection (n = 362).

Variables	Mean	SD	1	2	3	4
1. Task- involving Peer Motivational Climate, Time 1	5.25	.87				
2. Task- involving Peer Motivational Climate, Time 2	5.22	.80	.59*			
3. Perceived Autonomy Support from the Coach, Time 1	5.40	1.07	.50*	.38*		
4. Perceived Autonomy Support from the Coach, Time 2	5.27	1.06	.32*	.55*	.59*	
5. Intrinsic Motivation, Time 2	5.64	.91	.37*	.54*	.37*	.51*

Note. Variables with consequent “Time 1” assessed during the first data collection. Variables with consequent “Time 2” assessed during the second data collection, one-year later

* $p < .01$

Prior to testing the stability effects and cross-lagged relationships among three key variables related to motivation, a two-step confirmatory factor analysis models were conducted, as recommended by Mulaik & Millsap (2000), to establish whether the hypothesized model would display discriminant validity.

At first, discriminant validity between perceived autonomy support from the coach, task-involving motivational climate of peers (at Time 1 and Time 2), and intrinsic motivation (at Time 2) were examined through the specification of a model in which items of the respective latent constructs were set to load on their expected factors. Therefore, the CFA model, which assumed discriminant validity among the study constructs, was conducted with five latent factors and 48 items. Secondly, a congeneric CFA model was estimated in which a single factor would explain the relationships between the items of perceived autonomy support from the coach, task-involving motivational climate of peers at both time points, and intrinsic motivation at Time 2. The resulting discriminant validity model conformed to published criteria for good fit (Table 5, Model 1) and was superior in fit to the congeneric model in which all items loaded on a single factor (Table 5, Model 2). The factor intercorrelations from the measurement CFA model were all significant, but were significantly different from unity in each case, supporting their discriminant validity.

Table 5. Goodness of fit statistics for measurement and structural equation models.

Model	NNFI	CFI	.RMSEA	CI ₉₅ RMSEA	SB- χ^2 (df)
Model 1	.99	.99	.042	.039 – .046	1767.23 (1070)
Model 2	.82	.83	.12	.12 – .12	6856.56 (1080)
Model 3	.98	.98	.043	.040 – .047	1800.33 (1071)
Model 4	.98	.98	.045	.041 – .048	1805.73 (1072)

Note. Model 1 = Discriminant validity model; Model 2 = Congeneric model; Model 3 = Hypothesised structural equation model; Model 4 = Structural equation model in which both effects of social factors at Time 2 on intrinsic motivation were fixed to zero; NNFI = non-normed fit index; CFI = comparative fit index; RMSEA = root mean square error of approximation, CI₉₅ = 95% confidence interval; SB - χ^2 = Sattora-Bentler scaled chi-square; df = Degrees of freedom.

Structural estimation modelling was used to examine the temporal stability of perceived autonomy support from the coach and task-involving peer motivational climate and the cross-lagged relationships between these motivational factors on intrinsic motivation toward sport over one year period. The proposed structural equation model was specified in which the stability of the task-involving peer motivational climate and perceived autonomy support from coach over one-year period were estimated. In addition, the model specified longitudinal direct effects of previous task-involving peer motivational climate and perceived autonomy support from coach on intrinsic motivation at Time 2. Also, the model specified a direct effect of task-involving peer motivational climate and perceived autonomy support from coach at Time 2 on Intrinsic Motivation measured simultaneously. Finally, the model specified reciprocal cross-lagged effects between task-involving peer motivational climate and perceived autonomy support from coach across time.

The structural estimation model indicated that the proposed model satisfied multiple criteria of good fit (Table 5, Model 3). The longitudinal structural model and structural coefficients are presented in Figure 2. Focusing on the overall time-lagged model, task-involving peer motivational climate and autonomy support from the coach demonstrated autoregression over time. This tests the relative change in the distribution of the measured variables over time. A relatively high degree of stability was observed for both task-involving peer motivational climate ($\beta = .51$, confidence interval (CI₉₅) = .38 to .64, $p < .01$) and perceived autonomy support from the coach ($\beta = .58$, CI₉₅ = .44 to .73, $p < .01$) from Time 1 to Time 2. Additionally, the effects of task-involving peer climate (standardized coefficient = .37, CI₉₅ = .21 to .52, $p < .01$) and perceived autonomy support from the coach (standardized coefficient = .30, CI₉₅ = .14 to .45, $p < .01$) at Time 2 significantly predicted youth athletes' intrinsic motivation. In contrast, the direct effect of the climate and autonomy support measures at Time 1 on intrinsic motivation were not significant. Cross-lagged relationships indicated to the existence of significant path from perceived autonomy support from the coach to task-involving peer motivational climate (standardized coefficient = .16, CI₉₅ = .03 to .30, $p < .01$) but not vice versa.

Consequently, autonomy support from the coach was not affected by previous task-involving peer climate in sport context.

To confirm the longitudinal direct effect of perceived autonomy support from the coach and task-involving peer climate at Time 1 on intrinsic motivation at Time 2, an alternative model was estimated. In this model the both direct paths of social factors at Time 2 on intrinsic motivation were fixed to zero. In this alternative model the longitudinal direct effects of the perceived autonomy support from the coach and task-involving peer climate on intrinsic motivation in sport were significant, indicating that complete mediation occurred. The path coefficients were $\beta = .31, p < .01$, and $\beta = .24, p < .01$, respectively. Change in the longitudinal direct path coefficient as a result of fixing the effect of measured social factors at Time 2 on intrinsic motivation is shown in parenthesis in Figure 1. This restricted model indicated an acceptable fit with the data (Table 8, Model 4). There was a significant difference in the models goodness-of-fit chi-square ($\Delta\chi^2 = 5.4, \Delta df = 1, p < .01$) between the model that included this path as a free parameter (Table 5, Model 3) and the model that did not (Table 5, Model 4). In addition, there was a significant total ($\beta = .25, p < .01$) and indirect effect ($\beta = .20, p < .01$) of task-involving peer motivational climate on intrinsic motivation. Results also revealed a significant total ($\beta = .27, p < .01$) and indirect ($\beta = .23, p < .01$) effect of autonomy support from the coach on intrinsic motivation.

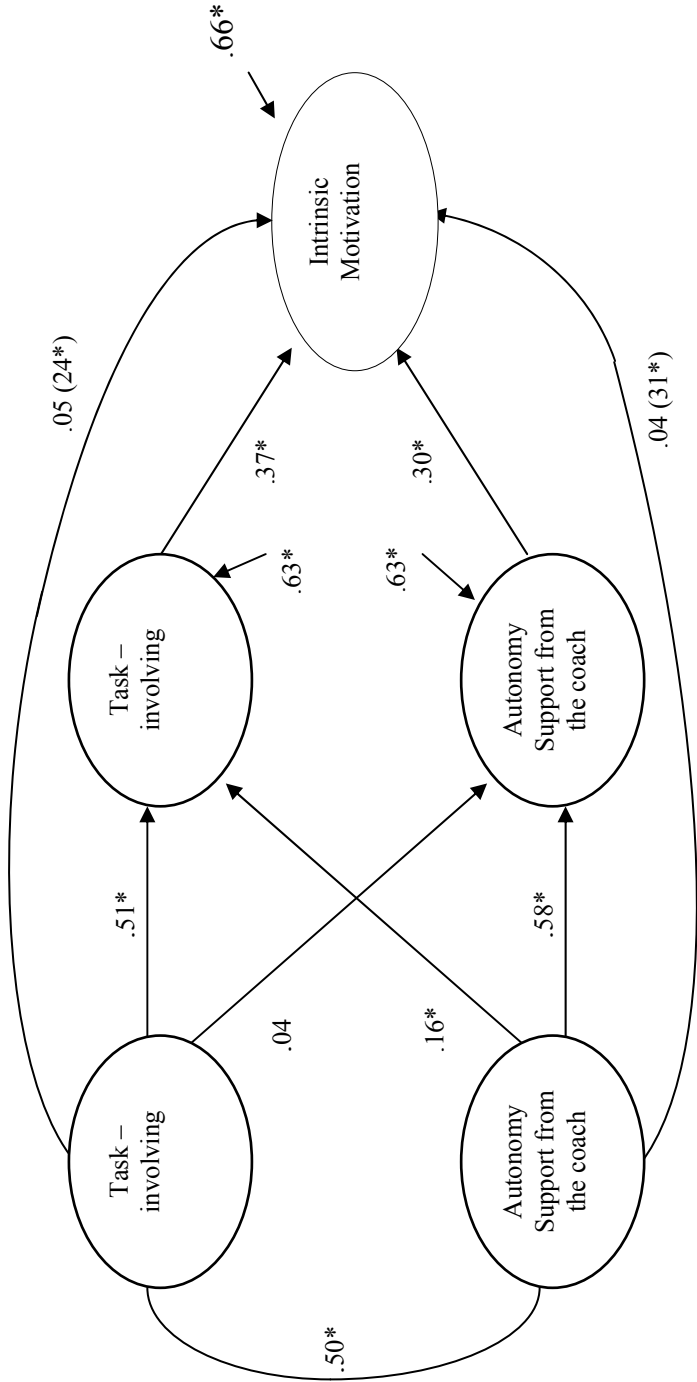


Figure 2. Structural Equation Model illustrating relationships among the perceptions of task-involving motivational climate of peers, perceived autonomy support from the coach, and intrinsic motivation variables in sport over a year.

5.4. Group differences in psychological and motivational variables between persistent and dropout athletes' and between groups with different years in training (Paper III)

Prior to testing the group differences several confirmatory factor analyses were used to provide support to the factorial validity for the scales of the Sport Climate Questionnaire (Hagger et al., 2003), the Peer Motivational Climate in Youth Sport Questionnaire (Ntoumanis & Vazou, 2005), the Sport Motivation Scale (Pelletier et al., 1995), and the Basic Psychological Needs in Exercise Scale (Vlachopoulos & Michailidou, 2006). Following indices of model fit recommended by Hu and Bentler (1999), the analyses produced well-fitting models for all scales with adequate factor loadings and error estimates. (see Paper III, preliminary analyses).

In order to examine the group differences in the perceptions of peer motivational climate, autonomy support from coaches and parents, basic psychological needs satisfaction, and sport motivation young athletes were divided into different groups.

The first multivariate analysis of variance (MANOVA) was performed with a dichotomous variable corresponding to Dropout or Persistent group as the independent variable, and perceived autonomy support from adults, peer motivational climate, basic psychological needs, and sport motivation as dependent variables. There was a significant main effect of group (Wilk's $\lambda = .96$; $F(16,640) = 1.67$, $p < .05$; $\eta^2_p = 0.04$). Then, the univariate ANOVA was conducted. As shown in Table 4, univariate follow-up tests revealed that the Persistent group perceived more autonomy support from parents and they reported higher scores on Improvement, Effort, and Relatedness/Support of the task-involving peer motivational climate than the Dropout group. The Persistent group also had higher scores on the autonomy, competence, and relatedness need satisfaction subscales compared to the Dropout group. In addition, compared with the Persistent group, the Dropout group perceived significantly less intrinsic types of motivation to know, to accomplish, to experience stimulation, and identified regulation (Table 5). Means for both groups on the Intra-team Conflict subscale from peer climate, and the extrinsic types of motivation and amotivation subscales were not statistically significantly different.

The second MANOVA, with training experience group as the independent variable and the same set of dependent variables, also yielded a significant main effect of group (Wilk's $\lambda = .87$; $F(32,1278) = 2.84$, $p < .001$; $\eta^2_p = 0.07$). Follow-up ANOVAs indicated significant univariate effects for the relatedness need satisfaction ($F(2,654) = 9.21$, $p < .01$; $\eta^2_p = 0.03$), external regulation ($F(2,654) = 4.32$, $p < .01$; $\eta^2_p = 0.02$), and on the Effort ($F(2,654) = 4.38$, $p < .01$; $\eta^2_p = 0.01$) and Intra-team Conflict ($F(2,654) = 4.97$, $p < .01$; $\eta^2_p = 0.02$) subscales of peer motivational climate.

Table 4. Mean and standard deviation of the variables according to sport continuation (dropout *versus* persisted athletes) and Analysis of Variance (ANOVA) results.

Variables	Dropout		Persisted		ANOVA results	
	Mean	SD	Mean	SD	<i>F</i> (1, 655)	η^2
Autonomy support from coach	5.35	1.15	5.49	1.09	2.32	0.00
Autonomy support from parents	5.80	1.05	6.02	1.00	8.03**	0.01
Improvement	5.05	1.02	5.20	1.04	3.78*	0.01
Effort	5.29	0.96	5.53	0.94	10.61**	0.02
Relatedness/Support	4.84	1.03	5.06	1.03	7.61**	0.01
Intra-team Conflict	3.69	1.30	3.59	1.27	0.91	0.00
Autonomy need satisfaction	3.79	0.76	3.91	0.72	4.89*	0.01
Competence need satisfaction	3.72	0.71	3.89	0.68	9.78**	0.02
Relatedness need satisfaction	3.91	0.86	4.05	0.81	4.76*	0.02
Intrinsic motivation to experience stimulation	5.24	1.15	5.54	1.09	11.35**	0.02
Intrinsic motivation to accomplish	5.41	1.16	5.62	1.03	6.17*	0.01
Intrinsic motivation to know	5.57	1.06	6.03	0.94	12.41**	0.02
Identified regulation	5.73	1.05	5.96	0.97	7.85**	0.02
Introjectid regulation	5.46	1.07	5.61	1.03	3.65	0.01
External regulation	4.53	1.27	4.65	1.24	1.33	0.00
Amotivation	3.39	1.61	3.20	1.61	2.22	0.00

Note. * $p < .05$; ** $p < .01$.

Subsequent *Post hoc* Fisher's LSD tests were used for comparisons between the groups with different training experience (see Paper II, Table 2.). The results revealed that participants in the High training group had significantly higher Effort scores than the participants in the Low training group. The Low and High training groups of participants perceived significantly less Intra-team Conflict than those in the Middle training group. *Post hoc* analysis also showed significant differences between groups of different years in training for participants' perceptions of relatedness need satisfaction and external regulation. The Low and Middle training groups perceived lower relatedness need satisfaction than the High training group. In addition, the Middle training group perceived significantly greater emphasis on external regulation than the Low training group.

6. DISCUSSION

6.1. Validity and reliability of the measures

This study was conducted to retest the construct validity of PeerMCYSQ (Ntoumanis & Vazou, 2005) in the context of Estonian culture setting. In Paper I the validity of the PeerMCYSQ was supported by the result of confirmatory factor analysis model. A five-factor solution, indicating to the existence of improvement, effort, relatedness/support, intra-team conflict, and intra-team competition/ability, presented adequate fit indices. However, its weakness was the high correlation between the task-involving factors. These findings were analogous with the study developing the PeerMCYSQ by Ntoumanis and Vazou (2005), which resulted in intercorrelation of task-involving factors upwards of .90. Even though they conducted several factor solutions with adequate fit for the PeerMCYSQ, they concluded that the five-factor model of the PeerMCYSQ is appropriate for use in research on the peer motivational climate in youth sport. In addition, validity of the PeerMCYSQ scores was supported by Smith et al. (2010).

Discriminant and congeneric validity with measures were estimated to establish the adequacy of the measurement model with peer motivational climate and basic psychological need satisfaction factors. The fit of the discriminant validity model was superior to that of the congeneric model and the goodness-of-fit statistics were acceptable for the discriminant validity model, but not the congeneric model. However, from the results of the discriminant validity model, one item in the intra-team competition/ability of the PeerMCYSQ ('Encourage each other to outplay their teammates') showed very low factor loading, which was not even close to the acceptable .40 minimum (Ford, MacCallum, & Tait, 1986). Internal reliability for the scale was also below the acceptable level. Consistent with research results obtained by Smith et al. (2010), the item scores on the intra-team competition/ability scale displayed marginal internal reliability. The same outcome also was evident in study of Vazou et al. (2006). Consequently, when this item was removed, the confirmatory factor analysis supported the produced discriminant validity of the measurement model.

In Paper II, the validity of the discriminant model with the three subscales of task-involving peer motivational climate and three subscales of intrinsic motivation was supported by the results of confirmatory factor analysis. Composite reliability coefficients for the subscales exceeded the recommended .70 minimum and all correlations were also significant.

In Paper III results of the confirmatory factor analysis produced well-fitting models for the Sport Climate Questionnaire, the Basic Psychological Needs in Exercise Scale, the Sport Motivation Scale, and the Peer Motivational Climate in Youth Sport Questionnaire. In addition, all scales indicated adequate factor loadings and error estimates, except the Intra-team Competition/Ability subscale of the Peer Motivational Climate in Youth Sport Questionnaire, which

remind under a level of .60 (Smith et al., 1995). Therefore, this subscale was eliminated from further analysis.

In conclusion, the results (Paper I, II, and III) provided support for the first hypothesis about the reliability and validity of the scales for measuring perceived psychological and motivational variables of Estonian youth athletes.

6.2. Influence of peer motivational climate on need satisfaction, motivation, and persistence in sport

The main purpose of this study was to investigate the effects of psychosocial determinants on youth athletes' persistence behaviour in sport. As hypothesized, the findings of this research provided support for the basic tenets of self-determination theory (Deci & Ryan, 1985) and achievement goal theory (Ames, 1992), emphasizing the role of the social context (and more explicitly the influence of peers) as a source of influence on intrinsic motivation and further participation. Results revealed that persistent athletes rated perceptions of task-involving peer climate, perceived psychological need satisfaction, and intrinsic motivation more highly than dropout youth athletes.

The results of the present study supported the second hypothesis that the task-involving peer motivational climate positively and significantly related to the perceived relatedness, autonomy, and competence need satisfaction. In contrast, the ego-involving dimension significantly and negatively influenced perceived relatedness need satisfaction and had no significant effect on the perceived autonomy and perceived competence need satisfaction constructs. Moreno et al. (2008) examined the perceived components of basic psychological needs and also found these to be positively related with perceived peer task-involving climate but not with perceived ego-involving climate. Overall, these findings are congruent with previous research, with respect to coach-created motivational climate, that have indicated the positive link between task-involving motivational climate and 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, Vallerand et al., 2002). In addition, this provides further support to Duda's (1992, 2001) argument that individuals with high task-orientation are less likely to feel incompetent in sport and unsatisfactory social links among other athletes than those with high ego orientation. Consistent with these results, findings of the current study, in respect of the peer-created motivational climate, may 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 is likely to occur 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. It can also be supposed that athletes' who perceive the climate to be ego-involving will feel autonomous and competent as long as they feel related with the others in the training group. Such circumstances may regulate or formalize within-team communications in ways that buffer dropout-related perceptions.

The results of this study showed no direct effect of task-involving peer motivational climate on intrinsic motivation. Surprisingly, the direct link between ego-involving peer climate and intrinsic motivation revealed to be positive not negative as hypothesized. This latter finding is inconsistent with the premise that individuals with high ego orientation are more interested in the anticipated outcomes of specific activity rather than in the activity itself (Nicholls, 1989). Keegan and colleagues (2009) have observed that peer influence appears to be qualitatively very different to coaches and parents, due to adults' singular position of authority. Peer influence may possibly be less consistent as a function of the context dependant and variability of peer relationships. Therefore, inconsistent of peer ego-involving influence might lead to the proposition that, relative to adults, the influence of ego-involving peer climate on motivation in young athletes may be less significant.

This study also supported the third hypothesis that peer motivational climate influences athletes' intrinsic motivation indirectly via the mediation of basic psychological needs. Specifically, the results of the present study indicated that perceived need satisfaction of autonomy, competence, and relatedness positively mediated the effect of task-involving peer climate on intrinsic motivation. Contrary, the negative indirect effect, but small in magnitude, from ego-involving climate on intrinsic motivation was identified only via perceived relatedness need satisfaction. The reasonable explanation for this might be that 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 similar with previous findings that has emphasized 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. In addition, Sarrazin and colleagues (2002) have reported congruent results that the impact of coach motivational climate on self-determined motivation was mediated by the female handballer's perception of autonomy, competence, and relatedness. Considering the findings of the previous research, the current results could suggest that peers' task-involving motivational climate will influence athletes' intrinsic motivation only in case in which they affect the athletes' perception of autonomy, competence, and relatedness. This finding is particularly encouraging since it may also indicate that athletes who feel that their psychological needs have been satisfied they will participate in activity for intrinsic reasons rather than extrinsic reasons, which has been shown to be a better predictor of long-term physical activity

(Mullen & Markland, 1997). Further, with respect to impact of the motivation on consequence, the results of the current study showed that intrinsic motivation positively predicted persistence in sport. This finding corroborates previous results with respect to dropout in sport settings (Sarrazin, Vallerand et al., 2002). Also, in line with a large body of evidence over the past two decades, the current results also 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).

Taken together the proposed model supported the fourth hypothesis about a significant overall indirect effect of dimensions of peer motivational climate on persistence in sport, via the mediation of psychological needs and intrinsic motivation. Specifically, these findings highlight the importance of task-involving peer motivational climate in shaping persistence perception in sport context. The current results showed a parallel pattern obtained in previous studies with respect supervisor created motivational climate, which showed perceived task-involving climate to be related to adaptive motivational outcomes (Ntoumanis & Biddle, 1999; Roberts et al., 2007). Future longitudinal research investigating the origins and process of athletes persistence or dropout behaviour, in particular from the perspective of the four-stage causal sequence forwarded by Sarrazin, Vallerand et al. (2002), should be conducted.

6.3. Longitudinal effect of perceived task-involving peer motivational climate and autonomy support from the coach on intrinsic motivation

Results showed that athletes' perception of autonomy support from the coach and task-involving peer climate demonstrated equal stability over the one-year period, totally supporting the fifth hypothesis. A parallel can be drawn between the results of this study and the work of Sage and Kavussanu's (2008), although their research focused on the adult created motivational climate. They reported that youth athletes' perceived task- and ego-involving climates were moderately stable over a competitive football season. The lack of longitudinal studies of peer motivational climate variables is a point of importance. One recent study by Ntoumanis and Vazou (2005) provided acceptable temporal stability over a period of four weeks for improvement, relatedness/support, and effort factors of task-involving peer climate. However, in the present study, the temporal stability for task-involving peer climate was found to exhibit moderate strength compared to these previous findings it still may serve as a starting point for future longitudinal studies investigating the temporal stability of motivational constructs related to self-regulation and motivation of sport involvement over time (Hagger, 2010; Hagger et al., 2010). An explanation for this might be that

longitudinal studies typically reveal that relationship strength is inversely proportional to the time lag in the measurement of the constructs (Gollob & Reichardt, 1987; Hagger et al., 2001).

The longitudinal structural model (Figure 2) confirmed the hypothesis (H6) that over time perceived autonomy support from the coach would have a greater influence on task-involving peer motivational climate than motivational climate would have on autonomy support. An alternative model, in which the effects of autonomy support from the coach and task-involving peer climate at Time 2 on intrinsic motivation in sport were constrained, supported also a longitudinal direct effects of these social constructs at Time 1 on later intrinsic motivation in sport. Consequently, the hypothesis (H7) that task-involving peer motivational climate and autonomy support from the coach would have direct and longitudinal effects on intrinsic motivation for sport participation found confirmation. The results of this model support the basic tenets of self-determination theory, that individuals' motivation toward activity is enhanced when participants are given more control and choice and are encouraged to be task-involved by significant others within the activity environment (Deci & Ryan, 1985).

Also noteworthy is the unique cross-lagged relationship from perceived autonomy support from the coach at Time 1 to task-involving peer motivational climate at Time 2, but not vice versa. Previous studies have shown coaches' autonomy-supportive behaviour to play a central role in shaping youth athletes' experience of sport (e.g., Mageau & Vallerand, 2003). In addition, limited support for the current findings can be linked with research conducted by Sage and Kavussanu (2008). In their study using cross-lagged analyses they demonstrated that prosocial behaviour at the beginning of the youth football season positively predicted task-involving climate at the end of the season. However, over a competitive season a significant direct effect from task-involving climate on prosocial behaviour did not occur.

The present findings suggest that in the context of sport participation where the athletes perceive their coach to consider their perspective and provide choice, youth athletes report closer and mutually respectful relationships with their teammates. It appears that building athletes' perceptions of autonomy support from the coach can enhance perceptions of peer task-involving motivational climate. Therefore, we can argue that even a modest level of autonomy support from the coach may result in changes in peer relationships with respect to each other.

In conclusion, the current results highlight the value of previous autonomy support from the coach in affecting later task-involving peer climate and that both motivational components from self-determination theory can enhance athletes' intrinsic motivation toward sport participation.

6.4. The group differences in perceived psychosocial variables between persistent and dropout youth athletes and between groups with different years in training

The examination of group differences between young athletes who dropped out after 2 year of training and those who continued training supported the hypothesis (H8) that persistent athletes perceived more autonomy support from parents and a more task-involving peer climate. They also had higher intrinsic types of motivation and higher feeling of perceived need satisfaction for autonomy, competence, and relatedness compared with participants who dropped out. The results of the analyses among groups of participants with different amounts of experience in training supported partially the hypothesis (H9) that participants with up to one year in training perceived less intra-team conflict from ego-involving peer climate, less effort from task-involving peer climate, less external motivation, and less need satisfaction for relatedness than participants with one to three years or more than three years in training.

Results revealed that persistent athletes displayed a higher feeling of perceived need satisfaction for autonomy, competence, and relatedness than discontinued participants. This is consistent with previous research by Guillet, et al. (2002), who reported that female athletes who continued to play handball perceived themselves as significantly more competent, more autonomous, and more related to their team than players who dropped out. In addition, the results showed that the group of athletes with more than three years in training reported significantly greater perception of relatedness need satisfaction compared with participants in the groups of up to one year and one to three years in training. These results are in accordance with self-determination theory (Deci & Ryan, 2000), which postulates that satisfaction of the needs for autonomy, relatedness, and competence is related proximately to increased content for the activity. Therefore, engagement in sport activity for many years creates a secure sense of belongingness with other athletes in their training group which in turn influences further continuation.

Persistent participants scored higher on the perceived improvement, effort, and relatedness/support components of task-involving peer climate than dropout participants. The current results did not indicate perceived differences in an ego-involving peer climate between dropout and persistent groups. To some extent, the results corroborate the finding obtained in previous study by Le Bars et al. (2009) who found differences in the perceptions of task-involving roles of significant others between dropouts and persisting athletes, while the dropouts' perceptions of ego-involving roles of peers did not differ from those of persisting athletes. Within the present study, participants with one to three years of training scored significantly higher intra-team conflict from ego-involving peer climate than participants with up to one year and more than three years of training. In contrast, participants with more than three years in training perceived significantly more effort from task-involving peer climate than participants up to one year in training. As characterized by Ntoumanis and

colleagues (2007), intra-team conflict comprises negative comments, laughter, and criticism when one makes mistakes or complaining when the team loses. Commonly, such communicative association can be stressful and may depress coherent team atmosphere. In contrast, components of task-involving peer climate might foster mutual encouragement to try their hardest, helpfulness and consideration to make the sport activity more enjoyable. This in turn is expected to intensify formation of close, responsive, and empowering relationships that are the cornerstones of positive cognition in young athletes (Jowett & Poczarowski, 2007). Therefore, these associations could be reflect that perceptions of task-involving peer climate, compared with ego-involving peer climate, are a more important source of influence in athletes' continued participation.

Third, in line with our expectations, youth athletes who persisted perceived significantly more autonomy support from parents and reported higher scores on intrinsic motivation to know, to accomplish, and to experience stimulation and more identified regulation compared to the athletes who dropped out. These findings are in accordance with those reported by Pelletier et al. (2001) and Sarrazin, Vallerand et al. (2002) in which athletes who dropped out had lower intrinsic motivation than those who persisted. In contrast, autonomy support from parents may provide children an enjoyable sport experience. Parents share information and provide extrinsic rewards for performance or effort to improve the athlete's performance. This finding is consistent with previous studies, which noted that social support provided by parents fulfills athletes' emotional, informational, and tangible functions (Bloom, 1985; Côté, 1999), and therefore, is positively associated with further participation in sport. As described within a large body of empirical research (Deci, 1975; Deci & Ryan, 1985; Lepper, Greene, & Nisbett, 1973; Mageau & Vallerand, 2003), the current study also indicates a link with athletes' persistence in activities that provide pleasure and satisfaction. Although, extrinsic motivation did not differ between persistent and dropout groups, the results showed that the group of athletes with one to three years of training perceived more external motivation than the group of athletes with up to one year in training. Self-determination theory argues that externally regulated behaviour is generally undertaken because of pressure from significant others (Deci & Ryan, 1985). Therefore, athletes who are involved in sport activity because of external rewards and not for its own sake may not continue their participation if other athletes in the training group engage in negative and unsupportive behaviour. Whereas previous research found that autonomy support from coaches played an active role in the nurturing of motivation for further engagement with sport (Deci & Ryan, 2002; Pelletier et al., 2001), in the current study no group differences in the perception of autonomy support from coaches were observed.

6.5. Practical recommendations

Based on the results, the proposed motivational model of sport persistence and prospective longitudinal model of motivation can give some practical recommendations for coaches who work with youth athletes. Results from this study highlight the important role of the peer group as a source of influence on intrinsic motivation and further behavioural persistence in sport. Parents and coaches should adopt autonomy supportive behaviours and encourage collaboration, learning, and effort among adolescents. In addition, it seems that fostering a task-involving peer climate is influential on satisfying the three basic psychological needs. It is important for coaches to develop a task-involving peer climate and avoid promoting an ego-involving peer climate, supporting athletes' autonomy and giving them time to practice and communicate with their teammates. In other words, as argued by Keegan et al. (2009), it involves working with the child-athlete and his/her peers on the development of an affective peer climate (e.g., "what makes a good teammate", "who makes you want to try hard and improve"?). This kind of training environment conception will have a positive impact on athletes' intrinsic motivation to participate in sport in the long run.

6.6. Limitations of the study

Although, the present study provided some interesting findings about the influence of specific components of peer motivational climate and perceived autonomy support from coach on intrinsic motivation and sport persistence among young athletes, there are also some limitations that must be acknowledged. First, the sample comprised young athletes aged 9–17 years. The extent to which these results generalize to different age groups and target population is unknown and should be empirically determine. Second, this study included youth athletes of different competitive standards. Further studies should extend longitudinal studies separately into categories of 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). In addition, it would be advisable to examine whether the differences exist in the perceptions of multiple social, environmental, and motivational variables among athletes at individual and team sport. Another limitation of the current study is that in the motivational model of persistence the intrinsic motivation predicted only 6% of the variance in actual behavioural persistence. This may be related with the fact that other external regulators, which were not included in the proposed model, may determine the athletes' behaviour. Thus, a third limitation is that this research was limited to the influence of peer motivational climate via the mediation of need satisfaction and intrinsic motivation only on persistence behaviour in sport. Further replication 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.

Fourthly, it has to be stressed that the structural model that examined the temporal stability and relationships of peer motivational climate and autonomy support from coach on motivation did not include important variable like autonomy support from parents that has been postulated to play important role in forming motivational climate and motivation in physical activity in pervious studies (Hagger et al., 2009). Furthermore, a more comprehensive integrative model of the two theories is needed that will take into account the climate generated by the coach, parent, and the peer group and try to determine the predictive power of each one on the motivation and persistence behaviour. This would allow researchers to gain better understanding of the attitudes, motivation and behaviours adopted by the population in a sport context (Moreno et al., 2008). Finally, the variable of athletes' years in training employed in this study has not been used as a behavioural measure of exercise participation in previous studies. Future replication of this classification using different age groups and target populations is advisable.

7. CONCLUSIONS

1. Confirmatory factor analysis showed that the Peer Motivational Climate in Youth Sport Questionnaire is appropriate for use among Estonian young athletes.
2. The structural model of the persistence behaviour in sport based on the self-determination theory and achievement goal theory was valid to predict athletes' intrinsic motivation and persistence behaviour among Estonian youth athletes.
3. The task-involving peer motivational climate was positively related to the perceived psychological need satisfactions and the ego-involving dimension negatively influenced perceived relatedness need satisfaction.
4. Task-involving peer motivational climate indirectly influenced youth athletes' intrinsic motivation and persistence in sport via their perceived need satisfaction of autonomy, competence, and relatedness.
5. Task-involving peer motivational climate was the only significant distal predictor of intrinsic motivation and sport persistence among the athletes.
6. Perceived autonomy support from the coach and task-involving peer climate demonstrated moderately stability over the one-year period.
7. Perceived autonomy support from coach was a significant determinant of task-involving peer motivational climate one year later but not vice versa.
8. Perceived autonomy support from the coach and task-involving peer climate had a longitudinal direct effect on intrinsic motivation over one year period.
9. Athletes who dropped out perceived significantly less competence, relatedness, and autonomy need satisfaction, and they perceived less autonomy support from parents and were less intrinsically motivated than persistent athletes.
10. Youth athletes with up to one year in training reported significantly lower effort and intra-team conflict with peers, relatedness need satisfaction, and external motivation than athletes with 1 to 3 years and more than 3 years in training.

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SUMMARY IN ESTONIAN

Tajutud motivatsioonilise keskkonna, treeneri autonoomse toetuse, psühholoogiliste vajaduste ja sisemise motivatsiooni mõju noorte sportimise jätkamisele

Vaatamata sellele, et igal aastal suur hulk lapsi seob ennast organiseeritud sportimisharrastusega (Ewing & Seefeldt, 2002), on spordi valdkonnas üha enam hakatud uurima põhjuseid, miks noored otsustavad valitud harrastuse pooleli jätta (Weiss & Ferrer-Caja, 2002; Weiss ja Petichkoff, 1989). Katkestamise põhjuseid on väga palju ja erinevaid. Varasemad uuringud spordist väljalangemise põhjuste leidmiseks (Cervelló et al., 2007; Fraser-Thomas et al., 2008; Gould, 1987; Gould et al., 1982; Le Bars et al., 2009; Pelletier et al., 2001; Roberts, 1992, 2001; Sarrazin et al., 2002) on toetunud peamiselt kahele motivatsiooni teooriale – eesmärgi saavutamise (Nicholls, 1989) ja enesemääratlemise teooriatele (Deci & Ryan, 1985). Teostatud uuringute tulemustega, mis hõlmavad endas nii sotsiaalseid, keskkonna, motivatsiooni kui ka psühholoogilisi tegureid, on rõhutatud motivatsiooniprotsessist kui tervikust arusaamist, et mõista spordiharrastuse katkestamiseni viinud põhjuseid. Peamine eeldus eelpoolmainitud kahe motivatsiooniteooria integreerimisel on sotsiaalsete tegurite tähtis roll mõjutamaks indiviidi saavutusega seotud käitumist (Ntoumanis, 2001). Spordi kontekstist lähtuvalt on treeneri käitumine, kui üks sotsiaalne tegur, eriti tähtis mõjufaktor (Mageau & Vallerand, 2003) sportlase motiveerimisel püsivalt tegeleda valitud alaga. Hiljutised uuringud on rõhutanud eakaaslaste rolli suurt osatähtsust spordiga tegelemisel ja motivatsioonilise keskkonna tajumisel (Brustad & Partridge, 2002; Hagger & Chatzisarantis, 2009; Ntoumanis & Vazou, 2005; Ullrich-French, & Smith, 2006). Käesolevaks ajaks on välja töötatud kaks mudelit (Pelletier et al., 2001; Sarrazin et al., 2002), mis iseloomustavad spordist välja langemisega seotud tegureid noorsportlastel. Mõlemates mudelites, mis hõlmavad eesmärgi saavutamise ja enesemääratlemise teooriatele tuginevaid komponente on uuritud treenerite poolt kujundatud motivatsioonilise treeningkeskkonna tajumist noorsportlastel ja selle mõju spordiga tegelemise motivatsioonile. Antud uuringus on asendatud treenerite poolt kujundatud motivatsioonilise treeningkeskkonna tajumise komponendid eakaaslaste motivatsioonilise treeningkeskkonna komponentidega kasutades Ntoumanis ja Vazou (2005) poolt väljatöötatud küsimustikku.

Uuringu peamine eesmärk oli välja selgitada erinevad sotsiaal-psühholoogilised tegurid, mis mõjutavad noorsportlaste motivatsiooni jätkuvalt tegeleda valitud spordialaga. Käesolev töö koosneb kolmest uuringust. Esimeses uuringus, tuginedes Sarrazini jt (2002) poolt välja pakutud spordis püsijäämise motivatsiooni mudelile, kasutati nelja järjestikkust etappi iseloomustamaks motivatsiooniga seotud protsessi, mis ajendavad indiviidi vastavale tegevusele ja sellega seotud tulemusele. Kasutatud mudelis esimene etapp hõlmas treening-

kaaslaste motivatsioonilise keskkonna tajumist, mis tuginedes teooriatele, mõjutab noorsportlase psühholoogilisi vajadusi, sisemist motivatsiooni ja püsijäämist valitud spordialal. Psühholoogilised vajadused omakorda avaldavad mõju püsijäämisele läbi sportlase sisemise motivatsiooni. Lisaks kontrolliti esimese uuringuga Ntoumanise ja Vazou (2005) poolt väljatöötatud treeningkaaslaste motivatsioonilise keskkonna küsimustiku (PeerMCYSQ) valiidsust Eesti noorsportlastega uuringute läbiviimiseks. Kajastatud uurimustöös osales 424 võistkonnaala sportlast vanuses 11–16 eluaastat. PeerMCYSQ valiidsuse kontrollimine näitas küsimustiku usaldusväärsust ja sobivust, et hinnata eakaaslaste grupi mõju sportlaste motivatsiooniga seotud käitumistele. Struktuurimudeli analüüsist saadud tulemused näitasid, et ülesandele-orienteeritud treeningkaaslaste motivatsiooniline keskkond mõjutab kaudselt, läbi tajutud psühholoogiliste vajaduste autonoomiale, kompetentsusele ja seotusele, nende sisemist motivatsiooni ja püsijäämist valitud spordialal. Samas egoalentoreeritud treeningkaaslaste keskkonna tajumise puhul puudus statistiliselt oluline mõju motivatsioonile ja püsijäämisele valitud alal.

Teises, aastase intervalliga longitudinaalses uuringus osales 362 noorsportlast. Õpilaste identifitseerimiseks kasutati nende sünnikuupäevi. Uuriti noorsportlase poolt tajutud treeneri autonoomse toetuse ja ülesandele-orienteeritud treeningkaaslaste motivatsioonilise keskkonna tajumise stabiilsust ja põhjuslikku seost nende vahel ning nende samade muutujate mõju sportlase sisemisele motivatsioonile treeningaastasel perioodil. Longitudinaalse uuringu tulemustest selgus, et ülesandele-orienteeritud treeningkaaslaste motivatsioonilise keskkonna tajumise ja treeneri autonoomse toetuse tajumine on üheaastase treeningperioodil võrdlemisi stabiilsed. Uuring näitas, et sportlaste tajutud treeneri autonoomne toetus mõjutab positiivselt ülesandele-orienteeritud treeningkaaslaste motivatsioonilise keskkonna tajumist, samas kui vastupidist mõju uuringu tulemustest ei ilmnenud. Lisaks ilmnes, et teisel mõõtmiskorral mõõdetud noorsportlaste sisemine motivatsioon oli mõjutatud samaaegselt mõõdetud nende mõlema sotsiaalse faktori poolt. Uuringus kasutatud alternatiivmudelitest saadud tulemused kinnitasid sportlaste tajutud treeneri autonoomse toetuse ja ülesandele-orienteeritud treeningkaaslaste motivatsioonilise keskkonna tajumise otsest mõju edasisele sisemisele motivatsioonile.

Kolmandas uuringus osalesid vaatlusalused nii esimesest kui ka teisest uuringust (N = 659, nendest 429 poisid ja 230 tüdrukut), milles hinnati gruppidevahelisi erinevusi noortespordis. Võttes aluseks erinevate sotsiaalsete faktorite, psühholoogiliste vajaduste ja motivatsiooni tüüpide tähtsust pikaajalisele spordile pühendumisele, oli töös kaks eesmärki. Esimene ülesanne oli uurida erinevate sotsiaal-psühholoogiliste ja motivatsiooni tegurite erinevusi püsijäänud ja väljalangenud sportlaste gruppide vahel. Saadud tulemused näitasid, et sportlased, kes loobusid oma valitud spordialaga jätkamisest, tundsid oluliselt vähem kompetentsuse-, seotuse- ja autonoomsuse vajaduste rahuldatust. Samuti tajusid nad vähem autonoomset toetust vanematelt ja olid kõigele lisaks veel vähem sisemiselt motiveeritud võrrelduna spordialaga jätkanutega. Sama uuringu teine eesmärk oli määrata erinevused erineva treening-

staažiga noorsportlaste gruppidel eelpoolnimetatud sotsiaal-psühholoogiliste muutujate vahel. Kolme grupi vaheline võrdlus näitas, et kuni ühe aastase treeningstaažiga noorsportlased esitasid madalamaid tulemusi eakaaslaste motivatsiooni kliima jõupingutuse ja tiimisisese konflikti alaskaaladele, seotusvajaduse rahuldamisele ja välimisele motivatsioonile võrrelduna kahe teise grupiga, kelle staaž ulatus 1 kuni 3 aastani ning üle kolme treeningaasta.

Kokkuvõtlikult, käesoleva uurimistöö tulemused näitasid, et treeningkaaslased mängivad täiskasvanute kõrval olulist rolli noorsportlase sisemise motivatsiooni kujundamisel ja avaldavad mõju valitud spordialal tegelemise püsivusele. Treenerid ja vanemad peaksid noortega töötades pöörama tähelepanu nende autonoomsust toetavale käitumisviisile ja julgustama noorte omavahelist koostööd, õppimist ja jõupingutust. Oluline on vältida egole-orienteeritud treeningeakaaslaste motivatsioonilise keskkonna kujunemist ning pigem aidata kaasa ülesandele-orienteeritud treeningeakaaslaste motivatsioonilise keskkonna kujunemisele, kuna viimane soodustab sportlase psühholoogiliste vajaduste rahuldamist ning avaldab mõju sisemise motivatsiooni kujunemisele. Eelpoolnimetatud komponentide olemasolu tagamine treeningprotsessis loob pinnase sportlase sisemisele motivatsioonile ja püsimisele valitud ala juures pikema aja vältel.

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PUBLICATIONS

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2009 „Kooli kehalise kasvatuse praktika juhendaja-mentori koolituskursus”, Tartu Ülikool, Tartu
2008 Rahvusvaheline treenerite konverents „Kehaliste võimete arendamine spordis”, Tartu Ülikool, Tartu
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Kokkuvõtte publikatsioonidest

- Teaduslikud artiklid rahvusvahelise levikuga ajakirjades – 3;
- Teaduskonverentside teesid – 4.

DISSERTATIONES KINESIOLOGIAE UNIVERSITATIS TARTUENSIS

1. **Lennart Raudsepp.** Physical activity, somatic characteristics, fitness and motor skill development in prepubertal children. Tartu, 1996, 138 p.
2. **Vello Hein.** Joint mobility in trunk forward flexion: methods and evaluation. Tartu, 1998, 107 p.
3. **Leila Oja.** Physical development and school readiness of children in transition from preschool to school. Tartu, 2002, 147 p.
4. **Helena Gapeyeva.** Knee extensor muscle function after arthroscopic partial meniscectomy. Tartu, 2002, 113 p.
5. **Roomet Viira.** Physical activity, ecological system model determinants and physical self-perception profile in early adolescence. Tartu, 2003, 167 p.
6. **Ando Pehme.** Effect of mechanical loading and ageing on myosin heavy chain turnover rate in fast-twitch skeletal muscle. Tartu, 2004, 121 p.
7. **Priit Kaasik.** Composition and turnover of myofibrillar proteins in volume — overtrained and glucocorticoid caused myopathic skeletal muscle. Tartu, 2004, 123 p.
8. **Jarek Mäestu.** The perceived recovery-stress state and selected hormonal markers of training stress in highly trained male rowers. Tartu, 2004, 109 p.
9. **Karin Alev.** Difference between myosin light and heavy chain isoforms patterns in fast- and slow-twitch skeletal muscle: effect of endurance training. Tartu, 2005, 117 p.
10. **Kristjan Kais.** Precompetitive state anxiety, self-confidence and athletic performance in volleyball and basketball players. Tartu, 2005, 99 p.
11. **Aire Leppik.** Changes in anthropometry, somatotype and body composition during puberty: a longitudinal study. Tartu, 2005, 161 p.
12. **Jaan Ereline.** Contractile properties of human skeletal muscles: Association with sports training, fatigue and posttetanic potentiation. Tartu, 2006, 133 p.
13. **Andre Koka.** The role of perceived teacher feedback and perceived learning environment on intrinsic motivation in physical education. Tartu, 2006, 137 p.
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17. **Eva-Maria Riso.** The effect of glucocorticoid myopathy, unloading and reloading on the skeletal muscle contractile apparatus and extracellular matrix. Tartu, 2007, 114 p.
18. **Terje Sööt.** Bone mineral values in young females with different physical activity patterns: association with body composition, leg strength and selected hormonal parameters. Tartu, 2007, 94 p.
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23. **Maret Pihu.** The components of social-cognitive models of motivation in predicting physical activity behaviour among school students. Tartu, 2009, 116 p.
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31. **Raul Rämson.** Adaptation of selected blood biochemical stress and energy turnover markers to different training regimens in highly trained male rowers. Tartu, 2011, 84 p.