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MARET PIHU

The components of social-cognitive models of motivation in predicting physical activity behaviour among school students



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LIST OF ORIGINAL PUBLICATIONS

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- II. Hagger, M. S., Chatzisarantis, N. L. D., Barkoukis, V., Wang, J. C. K., Hein, V., Pihu, M., Soós, I., & Karsai, I. (2007). Cross-cultural generalizability of the theory of planned behavior among young people in a physical activity context. Journal of Sport and Exercise Psychology, 29, 1–19.
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Paper I, II. Maret Pihu led the design of the study in Estonia, coordinated and participated in the translation process of study instruments, coordinated and participated in data collection, made statistical analyses for Estonian data, wrote a preliminary version of the parts of the article that involved Estonian results.

Paper III. Maret Pihu led the design of the study, coordinated and participated in data collection, made statistical analyses, wrote the manuscript.

I. INTRODUCTION

Physical activity is a fundamental means of improving people's physical and mental health. Two thirds of the adult population (people aged 15 years or more) in the European Union does not reach recommended levels of activity (Cavill, Kahlmeier, Racioppi, 2006). Schools can provide many opportunities for physical activity through physical education lessons, as this comprise a wide range of school students. Therefore, it is important how physical education teachers or physical education programmes effectively orient young people towards regular leisure-time physical activity outside of school (Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003). Researchers in the domain of physical activity are particularly interested in the psychological influences on exercise behaviour because these are considered manipulative through intervention to change behaviour (NICE, 2007). Therefore, to study psychological variables that influence students' motivation and physical activity in physical education and out of school context, a trans-contextual motivational model (Hagger et al., 2003) has developed. Trans-contextual model incorporates the components of self-determination theory (Deci & Ryan, 1985; Deci & Rvan, 2000) and the theory of planned behaviour (Ajzen, 1985; 1991). The model proposes motivational sequence that begins with perceived autonomy support and its influence on autonomous forms of motivation in physical education context, which in turn influence autonomous motivation toward physical activity in a leisure time context (Hagger, et al., 2003; Hagger, Chatzisarantis, Barkoukis, Wang, Baranowski, 2005). These motives are proposed to influence attitude, perceived behavioural control and subjective norms from the theory of planned behaviour, intentions toward physical activity engagement and actual physical activity (Hagger, Chatzisarantis, 2007). In this model perceived autonomy support from teachers was viewed as general autonomysupportive behaviours from teachers, and did not reflect specific forms of teachers' instructional behaviours.

The objectives of present study were to test the validity of the components of the social-cognitive models of motivation, and to investigate the influence of specific components of perceived autonomy support, such as the use of learning strategies and providing positive general feedback on physical activity behaviour via the motivational sequence proposed in the trans-contextual model.

2. REVIEW OF LITERATURE

2.1. Theoretical framework

Self-determination theory (Deci & Ryan, 1985; 2000) and the theory of planned behaviour (Ajzen, 1985; 1991) serve as the theoretical framework for the current work. Hagger et al. (2003) developed the trans-contextual model of motivation for exercise setting adopting constructs from self-determination theory (Deci & Ryan, 1985; 2000), the theory of planned behaviour (Ajzen, 1985; 1991) and the hierarchical model of motivation (Vallerand, 1997).

A primary premise behind the integration of self-determination theory (Deci & Ryan, 1985, 2000), the theory of planned behaviour (Ajzen, 1985; 1991) and the hierarchical model of motivation (Vallerand, 2007) in trans-contextual model is that they provide complementary explanations of the complex motivational processes involved in intentional behaviour. Self-determination theory provides the starting point for the trans-theoretical model and the key dispositional motivational constructs that energise behaviour in both physical education and leisure-time contexts. The theory of planned behaviour explains the process by which motivational constructs from self-determination theory are translated into action. Vallerand's (1997; 2007) hierarchical model provides a unifying framework that describes the links between the generalized, contexttied self-determination theory constructs, and the specific, situational constructs from the theory of planned behaviour. The theory of planned behaviour constructs reflects situational-level motivation, because measures of the theory constructs make reference to specific action, target, context, and time (Hagger, et al., 2005).

The model proposes a motivational sequence that begins with perceived autonomy support. Perceived autonomy support is depicted as the strongest influence on autonomous forms of motivation in a physical education context, which in turn influence autonomous motivation toward physical activity in a leisure time context (Hagger, et al., 2003; Hagger, et al., 2005; Hagger, Chatzisarantis, & Harris, 2006). These motives are proposed to influence the proximal decision-making constructs from the theory of planned behaviour that precede intentional behaviour, intentions toward future physical activity engagement, and actual physical activity behaviour.

2.2. Self-determination theory

Self-determination theory (Deci & Ryan, 1985; 2000) is central to the transcontextual model and provides a basis for the development of autonomous forms of motivation and the trans-contextual influence of autonomous forms of motivation on intentional behaviour (Ryan & Connell, 1989). Self-determination theory posits that individuals strive to satisfy three basic and universal psychological needs for autonomy (to feel self-determined in one's actions rather than feeling controlled), competence (to feel competent in dealing with one's environment), and relatedness (to feel that one has satisfying and supportive social relationships) (Deci & Ryan, 1985; 2000; Sheldon, Elliot, Kim, & Kasser, 2001). According to self-determination theory, these three needs can be satisfied while engaging in a wide variety of behaviours that may differ among individuals, and be differentially manifested in different cultures, but in any case their satisfaction is essential to the healthy development and well-being of all individuals, regardless of culture (Deci & Ryan, 2000). The needs determine the direction and persistence of an individual towards goaldirected behaviours that are likely to result in satisfying these needs.

Central to the self-determination theory is the distinction between autonomous and controlling forms of motivation (Deci & Ryan, 1985). This distinction is often viewed on a continuum reflecting the perceived origin or cause of an individual's motivated behaviour in a given context. This continuum is known as the perceived locus of causality (Ryan & Connell, 1989). Autonomous and controlled activities involve different types of regulatory processes, yet both are instances of intentional (i.e. motivated) behaviour. Intrinsic motivation lies at one extreme pole of the continuum. Alongside intrinsic motivation lie four forms or qualities of extrinsic motivation: external regulation, introjected, identified regulation and integrated regulation. In contrast, amotivation is a state in which people lack the intention to behave (Pelletier, Dion, Tuson, & Green-Demers, 1999).

According to self-determination theory, autonomy is a basic human need, and opportunities to experience autonomy are critical to well-being (Deci & Ryan, 1991; Ryan & Deci, 2000). Autonomy concerns the self-initiation or self-endorsement of one's behaviour. Autonomous motivation reflects engaging in behaviour, because it satisfies personally relevant goals and services innate psychological needs for autonomy, competence, and relatedness. In the research by Deci and Ryan (1985) the autonomy orientation was found to relate positively to self-esteem, ego development, and other indicators of well-being.

Intrinsic motivation is the prototypical form of autonomous motivation and refers to engaging in a behaviour for its own sake in the absence of any external reward (Deci & Ryan, 1985), while extrinsic forms of motivation are considered controlling in nature and reflect an individual's motivation to perform an activity, when reinforced by external contingencies, such as avoiding feelings of threat or guilt, gaining a reward, or avoiding punishment. The experience of intrinsic motivation is characterized by enjoyment, satisfaction, interest, and a sense of choice. Research revealed that choice, acknowledgment of feelings, and opportunities for self-direction were found to enhance intrinsic motivation because they allow people a greater feeling of autonomy (Deci & Ryan, 1985).

The extrinsically motivated behaviours that are least autonomous are referred to as externally regulated. Such behaviours are performed to satisfy an external demand or reward contingency. External regulation reflects engaging in behaviours due to external reinforcement, such as pressure from significant others. Externally regulated individuals tend to engage in behaviours only as long as the reinforcing factors are present and behaviour will desist when these factors are removed. A second type of extrinsic motivation is labeled introjected regulation. Introjection involves taking in a regulation but not fully accepting it as one's own. It is a relatively controlled form of regulation in which behaviours, performed to avoid guilt or anxiety, or to attain ego enhancements, such as pride (Deci & Ryan, 1995). Behaviours that are valued positively, but are not necessarily enjoyed, are characterised as being identified. The most autonomous form of extrinsic motivation is integrated regulation. Actions characterised by integrated motivation share many qualities with intrinsic motivation, although they are still considered extrinsic, because they are done to attain separable outcomes rather than for their inherent enjoyment. According to self-determination theory, people are likely to be amotivated when they lack either a sense of efficacy, or a sense of control with respect to a desired outcome – that is, when they are not able to regulate themselves with respect to a behaviour (Pelletier, Dion, Tuson, & Green-Demers, 1999).

2.3. The theory of planned behaviour

The theory of planned behaviour explains the proximal determinants of specific volitional behaviours. The theory of planned behaviour postulates that a person's intention to perform a given behaviour is a central determinant of that behaviour (Ajzen, 1985; Ajzen & Madden, 1986). Intention is an indicator of how hard people are willing to try (Bagozzi & Kimmel, 1995), and of how much effort they are planning to exert toward performance of behaviour. Intention is determined by three conceptually distinct variables: attitudes toward behaviour, subjective norms, and perceived behavioural control (Ajzen & Madden, 1986; Trafimow, & Duran, 1998). Attitude toward behaviour is the degree to which performance of behaviour is positively or negatively evaluated. Subjective norm is the perceived social pressure to either engage in behaviour or not. Perceived behavioural control refers to people's perceptions of their ability to perform a given behaviour. The attitude, subjective norms, and perceived behavioural control constructs reflect underlying sets of beliefs that people hold towards their performance of the target behaviour.

The theory of planned behaviour (Ajzen, 1985) was developed from the theory of reasoned action (Ajzen & Fishbein, 1980). Ajzen (1985) recognized that some behaviours tended to vary in the degree of volitional control an individual has over their execution. As a consequence, he modified the theory of reasoned action to include perceived behavioural control, a construct that reflects the extent to what people believe that they can control performance of social behaviour. Several studies support the argument that perceived behavioural control is an important variable for predicting the intention to exercise (Godin 1993; Hagger, Chatzisarantis, Harris, 2006). According to

Ajzen (1991) the perceived behavioural control can also predict behaviour directly when behaviour is not under complete volitional control and when perceived behavioural control is accurate in a sense that it reflects actual control. Tests of the theory of planned behaviour have provided strong evidence for the overall predictive validity of intentions, and have shown that attitudes and perceived behavioural control explain a substantial proportion of the variance in intentions (Armitage & Conner, 2001; Hagger, Chatzisarantis, & Biddle, 2002a). Additionally it has found that subjective norms insufficiently explain social influence (Courneya, Plotnikoff, Hotz, & Birket, 2000; Grube, Morgan, & McGree, 1986).

Several researches have found empirical support to the theory of planned behaviour (Godin, 1993; Blue, 1995; Hausenblas, Carron, Mack, 1997; Hagger, Chatzisarantis, Biddle, 2002a). An increasing number of studies have identified additional variables that might improve the predictive power of the theory of planned behaviour (Conner & Armitage, 1998; Courneya, Plotnikoff, Hotz, & Birkett, 2000; Rhodes & Courneya, 2003). For example Chatzisarantis, Hagger, Smith (2007) found that construct of perceived autonomy support could be one of the components of the theory of planned behaviour, as this construct influenced intentions directly and indirectly via attitudes. This result was supported also in a more recent study (Chatzisarantis, Hagger, Brickell, 2008), where the influence of perceived autonomy support on physical activity behaviour via attitudes and intentions was confirmed.

2.4. The hierarchical model of motivation and integration of theories in the trans-contextual model

According to Vallerand's (1997) hierarchical model of intrinsic and extrinsic motivation, the forms of motivation could be conceptualised as operating at three levels of generality: global, contextual, and specific. Motivation at the global level refers to a general motivational orientation to interact with the environment in an intrinsic, extrinsic or amotivated way. The second level is referred to as the contextual level. Motivation at the contextual level represents motivation to engage in a variety of behaviours in a given context, such as physical education or leisure-time physical activity. The most specific level is the situational level that refers to an individual's self-determined motivational pattern at a specific point in time, or with respect to a specific activity. Motivation is often seen as emanating top-down from the global level to the situational level (Vallerand & Ratelle, 2002) and motivation at a higher level in the hierarchy can influence motivation at the lower level.

In the trans-contextual model self-determination theory, the theory of planned behaviour and the hierarchical model of motivation were integrated on the basis of three premises. The first premise focused on the role of autonomous motives from self-determination theory in the formation of decision-making variables in models of social cognition, like the theory of planned behaviour. According to self-determination theory, individuals form autonomous motives toward physical activities because they expect that future participation in these kinds of behaviours is likely to satisfy psychological needs because they have done so in the past (Hagger et al., 2005). In addition, Ajzen's (1985) original account of the theory of planned behaviour hypothesized that attitudes, subjective norms, and perceived behavioural control are the sole proximal predictors of intentions, and will mediate the influence of all other external variables on intention. The second premise was based on the effects of contexttied autonomous motives on plans to act, and that actions are mediated by the social-cognitive constructs from the theory of planned behaviour at a situational level. This is concordant with Vallerand's (1997) hierarchical model and Deci and Ryan's (1985) original proposal, that theories of social cognition, like the theory of planned behaviour and self-determination theory, can complement each other. The third premise for integration is that motivational orientations from self-determination theory represent current internal motivational state of the individual. Measures of the theory of planned behaviour constructs reflect an individuals' level of attitude, subjective norm, perceived behavioural control, and intention toward engaging in the target behaviour at some future point in time. These constructs differ in terms of their focus and may offer explanations of the processes that lead to intentional behaviour (Hagger, Chatzisarantis, 2007).

2.5. Teachers' autonomy support

According to self-determination theory (Deci & Ryan, 1985; 1991), autonomysupportive environments (Edmunds, Ntoumanis, Duda, 2007; Standage, Gillison, Treasure, 2007) (i.e. social contexts that support choice, initiation, and understanding) and people's perceptions that the motivational context is supportive of their autonomous motivation facilitate autonomous motivation (Hagger, et al., 2003; Koka & Hein, 2003; Hein & Koka, 2007), healthy development, optimal psychological functioning, and behavioural persistence in educational contexts (Black & Deci, 2000; Reeve, 2002). In creating the autonomy-supportive environment in physical education in schools, the physical education teachers play an important role.

Teachers motivate students using interpersonal styles that range from highly controlling to highly autonomy-supportive. Relatively autonomy-supportive teachers generally encourage students to pursue self-determined agendas and then support students' initiatives and intrinsic motivation. This approach is autonomy-supportive because the teacher's goal is to strengthen students' autonomous self-regulation (Reeve, 1998). Studies have shown that teachers that are autonomy-supportive (in contrast to controlling) catalyse in their students a greater intrinsic motivation, curiosity, and desire for challenge (Deci, Nezlek, & Sheinman, 1981; Flink, Boggiano, & Barrett, 1990; Ryan &

Grolnick, 1986; Guay, Boggiano & Vallerand 2001). Similarly, studies show that autonomy-supportive parents, relative to controlling parents, have children who are more intrinsically motivated (Grolnick, Deci, & Ryan, 1997).

In physical education classes, autonomy support has been positively linked to a psychological need of satisfaction, self-determined motivation for physical activity in physical education and leisure-time activities, physical activity intentions, leisure-time physical activity behaviour, teacher ratings of motivated behaviour, and negatively linked with negative affect (Hagger et al., 2003; Hagger, et al., 2005; Ntoumanis, 2005; Standage, Duda, & Ntoumanis, 2003; 2005).

2.6. Specific components of teachers' autonomy-supportive behaviour

Researchers have worked to identify what specific behaviours teachers with an autonomy-supportive style enact during their instruction that differentiates their style from teachers with a relatively controlling style. Reeve and Jang (2006) presented 11 instructional behaviours based on the previous results of the autonomy-supportive behaviour researches (Deci, Speigel, Ryan, Koestner, & Kauffman, 1982; Flink, Boggiano & Barrett, 1990; Reeve, Bolt, Cai, 1999) that are consistently displayed more frequently by teachers categorized as autonomy-supportive. The results of the Reeve and Jang study (2006) showed that several instructional behaviours that support students' psychological needs (e.g. autonomy, competence, relatedness), correlated positively with students' experiences of autonomy, including listening, creating time for independent work, giving students opportunities to talk, praising signs of improvement and mastery, encouraging the students' effort, offering progress-enabling hints when students seemed stuck, being responsive to the students' questions and comments, and acknowledging the students' perspective and experiences.

Several researchers (Solmon & Boone, 1993; Solmon & Lee, 1996) have noted that cognitive variables produce valuable information about how students mediate instruction in physical education settings. It has been established that cognitive variables, such as students' reports of their attention, use of strategies, and motivational levels, impact measures of student engagement, student effort, and achievement in physical education classes (Solmon & Boone, 1993; Solmon & Lee, 1996). Social-cognitive research about motivation and learning has clearly shown that students' thinking or cognitions, in turn, influence their affect, motivational behaviour, and skill acquisition in physical education (Bakker, 1999). Solmon and Lee (1997) investigated the cognitive processes that mediate teachers' instruction in physical education classes. The authors found that numerous cognitive variables like self-regulation, confidenceefficacy, attention-concentration, willingness to engage, and the use of strategies to learn skills, were related to a learning-involved goal perspective and the belief that success is attributed to motivation and effort. Hein and Müür (2004) tested the mediating role of these cognitive processes in physical education context in the relationship between people's perceptions of a learning-oriented environment and physical activity intention. Findings indicated that the use of learning strategies was one of the most important mediators of this relationship. When students perceive that their teacher has provided information on how to perform better, it has allowed them to work independently, and has given them the opportunity to use learning strategies, then they are more likely to feel that the teacher has supported their autonomy. For example, the teacher may provide some additional hints concerning learning strategies to students on how to improve their performance. In this way teachers can encourage and support autonomous experiences in physical education by identifying students' inner motivational resources and creating opportunities for students that foster a sense of choice and interest.

Research has shown that students' perceptions of teachers' positive general feedback is related to intrinsic motivation in physical education (Koka & Hein, 2005). The extrinsic information provided by the teacher to the learner about his or her performance, is called feedback. Feedback is general when it could refer to either learner's movement or behaviour, and does not tell the learner exactly what was performed well or poorly. The results of the research (Koka & Hein, 2003) indicated that students' perceptions of positive general feedback predicted students' perceived competence, interest-enjoyment, and intrinsic motivation. These findings are in line with previous studies about teachers' feedback and perceived competence in sport and physical education context (Allen & Howe, 1998; Black & Weiss, 1992; Amorose & Horn, 2000; Wilson & Rodgers, 2004). More recent research (Koka & Hein, 2005) has shown that perceived teachers' feedback about knowledge of performance was the strongest predictor of students' intrinsic motivation after perceived positive general feedback among 14 to 18 year-old students. The previous results about general positive feedback suggest that teachers who provide general feedback, are more likely to be successful in transforming children's intrinsic motivation in physical education, because such teacher behaviour enhances children's perception of competence and their interest to physical activity. Despite this support for the influence of perceived positive general feedback on students' intrinsic motivation in physical education, past work has not tested the effect of perceived positive general feedback on intrinsic motivation in a leisure-time context and physical activity behaviour.

Therefore, the teachers support students' autonomy, when they provide students with knowledge about the use of learning strategies, and give them general positive feedback. Teachers teaching how to use learning strategies enables students to feel more independent and competent in the learning process, and through this students feel more autonomous in their actions. The present study focuses on two teachers' perceived instructional behaviours that support students' autonomy: giving hints how to use learning strategies to perform better and providing general positive feedback.

2.7. Measuring autonomy support

The perceived autonomy support scale (Deci & Ryan, 1987) measures the degree to which people perceive others in positions of authority to be autonomy-supportive. Several scales have been used to measure autonomy support in classroom (Black & Deci, 2000; Reeve et al., 1999; Reeve, 2002; Reeve, Nix, Hamm, 2003; Reeve & Jang, 2006). Black & Deci (2000) used The Learning Climate Questionnaire that was adapted by Williams and Deci (1996) from the Health-Care Climate Questionnaire (Williams, Grow, Freedman, Ryan, & Deci, 1996). This 15-item measure asked students questions, answered on Likert scales, about the degree to which their workshop leader supported their autonomy. The reliability coefficients for the Learning Climate Questionnaire were largely satisfactory, exceeding the recommended .70 minimum. In Reeve & Jang (2006) study students' perceived autonomy were scored from the students' 9-item Perceived Self-Determination Scale (Reeve. 2002: Reeve et al., 2003). Scores from the Perceived Self-Determination Scale have been shown to be valid in that they are sensitive to experimental manipulations known to affect perceptions of autonomy, such as provision of choice and exposure to an autonomy-supportive environment. Several scales have also been used measuring perceived autonomy support in the exercise domain (Conroy & Coatsworth, 2007; Pelletier, Fortier, Vallerand, & Briere, 2001; Wilson & Rodgers, 2004) and physical education context (Hagger et al., 2003; Chatzisarantis & Hagger, 2008; Ntoumanis, 2005). Perceived autonomy support in physical education context in trans-contextual motivation model (Hagger et al., 2003) was measured through six items. More recently Chatzisarantis & Hagger (2008) used adoption of 15-item Learning Climate Ouestionnaire (Williams, Saizow, Ross, Deci, 1997) to measure perceived autonomy support in physical education context. Despite the numerical aforementioned studies measuring autonomy support in different fields, there is a lack of valid instrument to measure autonomy support from teachers, parents and peers in respect of exercise setting in leisure time context.

2.8. Previous empirical research with the trans-contextual model

Tests of the trans-contextual model have provided support for the integration of self-determination theory, the hierarchical model of motivation and the theory of planned behaviour, and the hypothesized relationships among the model constructs (Hagger et al., 2003; Hagger et al., 2005; Hagger et al., 2008).

The results of the trans-contextual model (Hagger et al., 2003) indicated that an important step in promoting intrinsic motivation to participate in leisuretime physical activity might begin in school physical education. Hagger et al. (2003) found that perceived autonomy support in a physical education context influenced autonomous motivation in physical education. The results reported by Ntoumanis (2005) and Standage, Duda & Ntoumanis (2003) also highlighted the effect of perceived autonomy support on autonomous motivation in physical education. The proposed trans-contextual model showed that the four types of motivational regulation (external regulation, introjected, identified, and intrinsic) in a physical education context positively influenced the same regulatory types in a leisure-time physical activity context, with the strongest cross-contextual regression for intrinsic motivation. Further, perceived autonomy support from teachers predicted autonomous forms of motivation in physical education and leisure-time contexts, and autonomous forms of motivation in a leisure-time physical activity context also positively influenced attitudes, perceived behavioural control and via these factors physical activity intention and behaviour. These effects supported the previous findings (Chatzisarantis, Hagger, Biddle, & Karageorghis, 2002; Hagger, Chatzisarantis, Biddle 2002b). There was a small significant direct effect from autonomy support in physical education to leisure-time physical activity in the transcontextual model.

Previous research in physical education classes has shown that autonomy support has been positively linked to self-determined motivation for physical activity in physical education and leisure-time activities, physical activity intentions, leisure-time physical activity behaviour (Hagger et al., 2003; Hagger, et al., 2005). Reeve & Jang (2006) have identified what specific behaviours teachers with an autonomy-supportive style enact during their instruction. Hein & Müür (2004) found that the perceived use of learning strategies was one of the most important mediators in physical education context in the relationship between students' perceptions of a learning-oriented environment and physical activity intention. Additionally, the results have shown that students' perceptions of teachers' positive general feedback is related to intrinsic motivation in physical education (Koka & Hein, 2005). In the initial trans-contextual model (Hagger et al., 2003) perceived autonomy support from the teacher was viewed as general autonomy-supportive behaviours and this did not reflect specific forms of teachers' instructional behaviours. Therefore, the subject of this study is to resolve this issue by incorporating specific components of perceived autonomy support such as the use of learning strategies and providing positive general feedback in transcontextual motivational model.

3. OBJECTIVES OF THE STUDY

The objectives of the present study were to test the components of socialcognitive models of motivation among Estonian school students and to extend the trans-contextual model by incorporating specific components of perceived autonomy support in physical education in trans-contextual model.

In this study it was hypothesised (H1) that perceived autonomy support scale for exercise settings and constructs from the theory of planned behaviour will exhibit appropriate fit and is a valid instrument to use among Estonian school students. Basing on self-determination theory and the importance of perceived autonomy support from teachers it was hypothesized (H2) that students' perceptions of how they use learning strategies in physical education context taught by their teachers would influence students' intrinsic motivation in physical education. Additionally it was hypothesized (H3) that use of learning strategies and perceived teachers' positive general feedback would influence intrinsic motivation in a leisure time context via the mediation of intrinsic motivation in a physical education context as hypothesised in the transcontextual model. In accordance with the trans-contextual model (Hagger et al., 2003; 2005), it was also assumed (H4) that the intrinsic motivation in physical education influences intrinsic motivation in leisure-time, intrinsic motivation in leisure-time influences intentions through the attitudes and perceived behavioural control, and intentions predict physical activity behaviour. Finally it was hypothesized (H5) that there would be significant total effect of use of learning strategies and perceived teachers' positive general feedback on physical activity behaviour via the motivational sequence proposed in the transcontextual model. The total effect was expected to be indirect through the motivational sequence in the model that includes intrinsic motivation in physical education and leisure-time contexts, attitudes, perceived behavioural control, and physical activity intention.

The specific aims of the study were:

- 1. To test the validity of the three different perceived autonomy support scales (perceived autonomy support from physical education teacher, peer and parents) for exercise settings among school children in Estonia and to evaluate the appropriateness of the measure in respect of other cultural groups.
- 2. To evaluate the construct validity of the theory of planned behaviour measures among Estonian students in physical activity context and to compare the results with other cultural groups.
- 3. To test the effects of attitude, subjective norms and perceived behavioural control on physical activity intention and physical activity behaviour among Estonian school students, and to identify cultural variations in the patterns of effects among the theory of planned behaviour constructs in school students' physical activity participation.

- 4. To investigate the influence of students perceived use of learning strategies in physical education context to students' intrinsic motivation in physical education in the modified trans-contextual model.
- 5. To test the influences the use of learning strategies and perceived teachers' positive general feedback on intrinsic motivation has in leisure time context via the mediation of intrinsic motivation in a physical education context.
- 6. To investigate the influences of intrinsic motivation in leisure-time context to physical activity behaviour.

4. METHODS

4.1. Participants and research design

In Paper I and II the participants were 268 Estonian school students, (M age = 15.04, SD = .91; Boys n = 117; M age = 15.04, SD = .96; Girls, n = 151, M age = 15.05, SD = .87).

In Paper I school students completed self-report measures of perceived autonomy support scale for exercise settings (Paper I Study I) to measure perceived autonomy support from three sources: physical education teacher, peers, and parents. To measure perceived autonomy support from different sources the items were worded so that they made reference to the different sources of autonomy support.

In the first occasion of data collection in Paper II school students completed questionnaires containing measures of the components of the theory of planned behaviour (Ajzen, 1985). After five weeks, self-reported physical activity behaviour was measured using the Leisure-Time Exercise Questionnaire (LTEQ, Godin & Shephard, 1985).

In Paper III the participants were 399 Estonian school students aged 12 to 18 years (Boys = 123, Girls = 276, M Age = 14.7 years, SD = 1.4). A threewave prospective design was used. In the first occasion of data collection (Time 1), self-report measures of intrinsic motivation in a physical education context (Ryan & Connell, 1989), use of learning strategies from the Cognitive Processes Questionnaire in Physical Education (CPQPE; Solmon & Lee, 1997), and perceived teacher's positive general feedback from the Perceptions of the Teacher's Feedback (PTF) questionnaire (Koka & Hein, 2005) were used. One week later (time 2), a second questionnaire containing measures of the three components of the theory of planned behaviour (Ajzen, 1985) and intrinsic motivation in a leisure-time physical activity context (Mullan, Markland, & Ingledew, 1997) was administered. From the theory of planned behaviour the perceived behavioural control, attitudes, and intentions were measured. Subjective norms were excluded because this is not the most theoretically relevant social influence construct for understanding behaviour (Courneya & McAuley, 1994; Courneya, Plotnikoff, Hotz, & Birkett, 2000) and has been consistently shown to be a weak predictor of physical activity intentions relative to attitude and perceived behavioural control (Blue, 1995; Godin & Kok, 1996; Hausenblas, Carron, & Mack, 1997).

A one-week delay was employed to avoid presenting similar motivational measures on a single occasion thereby reducing common-method variance. After five weeks, self-reported physical activity behaviour was measured at a third point in time (time 3) using the Leisure-Time Exercise Questionnaire (LTEQ, Godin & Shephard, 1985). Measures across time-points were matched using birth date and gender.

4.2. Measures

In Paper I school children completed a 12-item self-report measures of perceived autonomy support scale for exercise settings to measure autonomy support from three different sources: physical education teacher, peers, and parents. Responses were recorded on 7-point, Likert-type scales ranging from 1 ("strongly disagree") to 7 ("strongly agree"). The measure asked respondents to rate the extent to which the target referent or referent group supported their autonomy in a given context. An example item from the scale is: "I feel that my physical education teacher/peers/parents provide(s) me with choices, options, and opportunities to do active sports and/or vigorous exercise in my free time". This measure was developed and tested by Hagger et al. (2007) among British school students. The results indicated good validity and reliability of the 12-item perceived autonomy support scale for exercise settings construct with physical education teachers as the salient source among British school students.

In Paper II young people in the first wave (Time 1) completed a questionnaire containing measures of the components of the theory of planned behaviour (Aizen, 1985). The intention scale contained three items (e.g. "I intend to participate in vigorous physical activities for 20 minutes at a time at least three times per week in the next five weeks") on 6-point Likert-type scales anchored by 1 ("strongly agree") to 6 ("strongly disagree"). Attitudes were measured on a five 6-point semantic differential scale with the bipolar adjectives: bad-good, unenjovable-enjovable, harmful-beneficial. useful-useless, and boring*interesting* in response to the common stem: "For me, doing vigorous physical activities for 20 minutes at a time at least three times per week in the next five weeks is...". Subjective norms were measured by two items (e.g. "Most people who are important to me would want me to do vigorous physical activities for at least 20 minutes at a time at least three times per week in the next 5 weeks") on a 6-point Likert-type scale with 1 ("strongly disagree") to 6 ("strongly agree"). Three items comprised the measure of perceived behavioural control (e.g. "How much personal control do you think you have in doing vigorous physical activities for 20 minutes at a time at least three times per week in the next 5 weeks") measured on a 1-point Likert-type scale ranging from 1 ("complete control") to 6 ("no control at all"). Self-reported physical activity behaviour at the second time point was assessed on two items from the Leisure-Time Exercise Ouestionnaire (LTEO, Godin & Shephard, 1985) using a 6-point Likert scale. The questionnaire asked two questions regarding how many times and how often the individual had engaged in vigorous exercise or active sports for at least 20 minutes over the past five weeks. The statement for the first behaviour question was "In the course of the past five weeks, how often have you participated in vigorous physical activities for 20 minutes at a time?" with scale points labeled everyday, most days, on about half of the days, a few times but less than half, a few times, and almost never. The second item was, "I engaged in vigorous physical activity for 20 minutes at a time with the

following regularity . . ." with the following scale labels: everyday, most days, some days, occasionally, very seldom, and never.

In the first wave (Time 1) of collecting data in Paper III the use of learning strategies, perceived teacher's positive general feedback and the intrinsic motivation in a physical education context were assessed. The use of learning strategies was assessed by responses to the Cognitive Processes Questionnaire in Physical Education (CPQPE; Solmon & Lee, 1997). This subscale consisted of five items (e.g. "When the teacher explains a skill, I practice the skill in my mind.". "When I am practicing a skill, I try to think how it is like something I already know") rated on a five-point Likert-type scales from "strongly agree" (5) to "strongly disagree" (1). Perception of teachers' positive general feedback was measured through three items (e.g. "The teacher often praises me") from the Perceptions of the Teacher's Feedback questionnaire (Koka & Hein, 2005). Responses were made on a five-point Likert-type scales with choices ranging from "strongly agree" (5) to "strongly disagree" (1). Intrinsic motivation in physical education context was assessed through the intrinsic motivation subscale from the modified version of Ryan and Connell's (1989) measure in an educational setting (Hagger et al., 2003). Intrinsic motivation was measured via the common stem question: "Why do you participate in physical education?" followed by four reasons (e.g. "because PE is fun"). Responses were measured on a 4-point Likert-type scale ranging from "very true" (4) to "not true at all" (1).

One week later (Time 2), the intrinsic motivation subscale from Mullan et al.'s (1997) Behavioural Regulation in Exercise Questionnaire (BREQ) assessed intrinsic motivation in a leisure-time physical activity context. Responses to the four intrinsic motivation items (e.g. "I exercise because it is fun") were measured on a seven-point scale ranging from "very true" (7) to "not true at all" (1). In time 2 also school students attitudes, intentions and perceived behavioural control from the theory of planned behaviour were assessed. Behavioural intentions (Ajzen & Madden, 1986; Courneya & McAuley, 1994) were assessed through three items (e.g. "I intend to do active sports and/or vigorous physical activities in the next four weeks...") using a seven-point Likert-type scale anchored by "strongly agree" (7) to "strongly disagree" (1). Attitudes were assessed in response to the following statement: "Participating in active sports and/or vigorous physical activities during my leisure time in the next five weeks is..." Responses were measured on four seven-point semanticdifferential items with the following adjectival end points: bad-good, harmfulbeneficial, unenjoyable-enjoyable, useful-useless, and boring-interesting. One adjective reflected moral evaluations (bad/good), two adjectives reflected instrumental evaluations (useful/useless, harmful/beneficial), and two adjectives reflected affective evaluations (unenjoyable/enjoyable, boring/interesting). Perceived behavioural control was assessed through three items (e.g. "I feel in complete control over whether I do active sports and/or vigorous physical activities in my leisure time in the next five weeks") measured on a seven-point Likert-type scales ranging from "complete control" (7) to "no control" (1).

After five weeks (Time 3), participation in physical activities was assessed through an adaptation of Godin and Sheperd's (1985) Leisure-Time Exercise Questionnaire. This asked how many times the individual engaged in vigorous exercise for at least 20 minutes per occasion in the past four weeks.

4.3. Research procedure

In all cases, the students, school principals, and teachers granted prior consent for the data to be collected in their schools. Participants were informed that they would be asked to complete a series of short questionnaires as part of a survey on young people. Participants were separated so that they could not copy or discuss responses. All of the questionnaires were completed anonymously to preserve confidentiality.

4.4. Statistical analysis

The data was analysed using SPSS 10.0 and LISREL 8.51 computer programs. First, multiple imputations were used to replace missing observations with observations from cases with a similar profile of scores. Multiple imputations were chosen to generate estimates that better reflect the true variability and uncertainty in the data than regression methods. In this method the results are combined and the average is reported as the estimate. Pearson correlations analysis was used to study relationships between study variables. Confirmatory factor analyses and structural equation modelling were conducted with maximum likelihood procedures for each study. Confirmatory factor analyses model tested the adequacy of the study measures in representing their associated hypothesized constructs using latent (unobserved) variables indicated by the questionnaire items pertaining to each construct. The adequacy of the confirmatory factor analyses and structural equation model was evaluated 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). Simulation studies have shown that these fit indices are least influenced by sample size (Fan, Thompson, & Wang, 1999). For the CFI and NNFI cut-off values of .90 are generally considered to represent acceptable fit (Bentler, 1990), although values approaching .95 are preferable (Hu & Bentler, 1999). Browne and Cudeck (1989) suggest that a RMSEA value of 0.05 or less indicates good fit, and that values up to 0.08 represent errors that approximate to those expected in the population. In addition, the 90% CI of the RMSEA should be narrow, its lower bound close to zero, and its upper bound ideally less than .08 for a well-fitting model (Bollen & Long, 1993).

To demonstrate the discriminant validity of the perceived autonomy support factors from different sources and theory of planned behaviour measures, congeneric and discriminant validity models were estimated. According to Mulaik and Millsap (2000), discriminant validity is supported if the goodnessof-fit of the discriminant validity model is superior to the congeneric model. Ideally, the goodness-of-fit statistics for the congeneric model would fall short of acceptable limits. Discriminant validity is further supported if the correlations among the factors representing the perceived autonomy support factors were significantly different from unity (Bagozzi & Yi, 1994).

To confirm the mediation of the effects of attitudes, subjective norms, and perceived behavioural control on behaviour by intention (Paper II), and to confirm the complete mediation of the effects of positive general feedback and use of learning strategies on intrinsic motivation in leisure-time by intrinsic motivation in physical education (Paper III), several tests of mediation were conducted. To control these hypotheses Baron and Kenny's (1986) criteria for mediation was used. There are four criteria that require satisfaction in order for mediation to be supported: (1) the dependent variable should be correlated with the independent variable(s); (2) the mediator should be correlated with the independent variable(s); (3) the mediator should have a significant unique effect on the dependent variable, when it is included alongside the independent variable(s) in a multivariate test of these relationships; and (4) the effect of independent variable(s) on the dependent variable should be significantly attenuated or nullified, when the mediator is included as an independent predictor of the dependent variable (Baron & Kenny, 1986).

5. RESULTS

5.1. Validity of the perceived autonomy support scale for exercise settings

Three confirmatory factor analysis models with 12 perceived autonomy support items were estimated: for physical education teachers, parents and peers. To estimate each of the confirmatory factor analyses models, the 12 items were set to load on a single perceived autonomy support factor and a single loading arbitrarily was set to unity to define the factor scale. Factor loadings for the confirmatory factor analyses models are presented in Table 1. Standardized factor loadings from the confirmatory factor analyses of the perceived autonomy support scale in exercise settings for British and Hungarian sample were also all large and significant and exceeded the required minimum (see Paper I, Table 4).

The results of the confirmatory factor analyses confirmed the good fit of the models and supported the replicability of the model in Estonian school students. As the confirmatory factor analyses models satisfied cut-off criteria for goodness-of-fit, it also supported the factor structure of the perceived autonomy support scale for exercise setting for the different sources of autonomy support. The goodness-of-fit statistics supported the factor structure of the perceived autonomy support scale in exercise settings from the three sources also for British and Hungarian samples (see Paper I, Table 4).

Item	Physical education teacher	Peer	Parent
1	.636	.650	.756
2	.787	.644	.739
3	.634	.713	.765
4	.697	.729	.746
5	.655	.648	.785
6	.779	.754	.749
7	.658	.755	.781
8	.673	.619	.794
9	.690	.633	.640
10	.797	.685	.756
11	.538	.688	.699
12	.558	.571	.651

Table 1. Standardized factor loadings from the confirmatory factor analyses of the perceived autonomy support scale in exercise settings.

	χ^2	df	CFI	NNFI	RMSEA	CI ₉₀
						RMSEA
12-item PASSES	93.251**	54	.967	.960	.052	.034–.069
model - PE teacher						
12-item PASSES	90.836**	54	.969	.962	.051	.032068
model – Peer						
12-item PASSES	64.042**	54	.992	.990	.026	.001049
model - Parent						
Congeneric model	1977.668**	594	.676	.657	.093	.089–.098
Discriminant validity	787.382**	591	.954	.951	.035	.028042
model						
** p<.01.						

Table 2. Goodness-of-fit statistics for single-sample confirmatory factor analyses of the perceived autonomy support scale for exercise settings.

Discriminant and congeneric models were estimated to demonstrate the discriminant validity of the perceived autonomy support factors of physical education teachers, parents and peers. The congeneric model included 12 items from the perceived autonomy support scale for exercise settings for each source of perceived autonomy support and hypothesized, that these all loaded on the same factor and did not differentiate between the sources. This model did not assume discriminant validity. The fit of this model was compared with a discriminant validity model, in which items from each source of perceived autonomy from the perceived autonomy support scale for exercise settings were set to load on their respective factors representing the physical education teacher, parent, and peer sources. Goodness-of-fit statistics for the congeneric and discriminant validity models are provided in Table 2. The fit of the congeneric models was inferior to the discriminant validity model and the goodness-of-fit statistics were acceptable for the discriminant validity models, but not the congeneric models. The goodness-offit statistics of British and Hungarian samples were acceptable for the discriminant validity models but not for the congeneric models (see Paper I, Table 3).

Table 3 shows correlations among the three factors representing perceived autonomy support from the physical education teachers, parents and peer sources. Also the descriptive statistics and composite reliability coefficients for the latent factors are given in Table 3.

Table 3.	Descriptive	statistics	and	intercorrelations	among	the	perceived	autonomy
support se	cale for exerc	ise setting	s co	nstructs.				

	Factor	М	SD	pc	1	2
1	Percieved autonomy support from	4.18	1.109	.910		
	physical education teachers					
2	Perceived autonomy support from peers	4.712	1.089	.909	.357**	
3	Percieved autonomy support from parents	4.968	1.134	.935	.374**	.783**

Note. pc = composite reliability coefficient. ** p<.01.

The correlations were all significant, but were significantly different from unity in each case, supporting their discriminant validity. Perceived autonomy support from parents and peers was more strongly related compared to their associations with physical education teachers. These results provide evidence to support the discriminant validity of the measures of perceived autonomy support from the different sources. Also perceived autonomy support factors for three different sources exhibited very good reliability. Descriptive statistics and intercorrelations among the perceived autonomy support from the different sources for the British and Hungarian sample are presented in Paper I Table 5.

5.2. Testing the components of the theory of planned behaviour among Estonian school students

A confirmatory factor analysis was used to estimate the adequacy of the constructs from the theory of planned behaviour. Intercorrelations among the latent variables provided evidence for the discriminant validity of the constructs. The goodness-of-fit indices of the confirmatory factor model were acceptable (Table 4). The goodness-of-fit statistics for the British, Greek, Hungarian, and Singaporean confirmatory factor analysis models also approached the cut-off value for the well-fitting model. Also standardized factor loadings for the latent factor on each of its indicators were positive and significant, meanwhile only one item for the perceived behavioural control factor in the British and Singaporean samples and one item each for the intention and subjective norm factors in the Greek sample exhibited low factor loadings (see Paper, II Table 1).

Model	χ^2	df	CFI	NNFI	RMSEA
CFA	125.463**	78	.974	.966	.048
SEM	129.079**	81	.974	.966	.047

Table 4. Goodness of fit statistics for confirmatory factor analytic and structural equation models of the theory of planned behaviour in a physical activity context.

Note. CFA = confirmatory factor analysis; SEM = structural equation model; χ^2 = chisquare; df = degrees of freedom; CFI = comparative fit index; NNFI = non-normed fit index; and RMSEA = root-mean squared error of approximation.

Table 5 shows factor correlations and composite reliability coefficients of the confirmatory factor analyses model of the theory of planned behaviour constructs. Composite reliability coefficients exhibited good reliability, exceeding the recommended .70 minimum. All factor correlations were significantly different from unity, providing evidence to support the discriminant

validity of the theory of planned behaviour constructs also in British, Greek, Hungarian, and Singaporean samples. Composite reliability coefficients were also largely satisfactory for these samples. Exceptions were the reliability coefficients for the subjective norm construct in the confirmatory factor analysis for the Greek, British, and Hungarian samples, perceived behavioural construct for the British and Singaporean samples and intention subscale for the Greek sample (see Paper II, Table 2).

Factor	рс	1	2	3	4
1. Behaviour	.837				
2. Intention	.922	.713**			
3. Attitude	.843	.583**	.696**		
4. Subjective norms	.710	.511**	.677**	.671**	
5. Percieved behavioural	.810	.294**	.415**	.444**	.750**
control					

Table 5. Factor correlations for the latent factors from the confirmatory factor analyses of the theory of planned behaviour.

Note. pc = composite reliability coefficient. **p < .01

Structural equation modelling was used to examine the effect of attitudes, subjective norms, and perceived behavioural control on physical activity intention and its effect to physical activity behaviour. Therefore intention was set to be the only predictor of physical activity behaviour, while intention was set to be predicted by attitudes, subjective norms, and perceived behavioural control (Figure 1). The attitude, subjective norms, and perceived behavioural control constructs were all made to correlate with each other. Goodness-of-fit statistics for the structural model was acceptable (Table 4). Attitudes and perceived behavioural control were significant predictors of intention. The model supported the hypothesis that intention is the only predictor of behaviour and completely mediates the effects of attitudes, perceived behavioural control, and subjective norms on behaviour. To confirm mediation the first model tested whether the direct effects of the independent factors (attitude, subjective norms, perceived behavioural control) on the dependent variable (behaviour) were significant. The second model tested whether direct effects of attitude, subjective norms and perceived behavioural control constructs on behaviour were significant, when the path from intention to behaviour was dropped. These models showed no significant direct effects of independent variables to behaviour, so the third model ensured the indirect effect of exogenous variables on behaviour through intentions.



Figure 1. Structural equation model of the theory of planned behaviour measures presenting structural parameters, latent factor correlations, and unexplained variances.

Attitudes and perceived behavioural control were significant predictors of intention also in British, Greek, and Singaporean samples. In the Hungarian sample only attitude and subjective norms were the significant predictors. Intentions were the sole predictor of behaviour with no significant direct effects of the other theory of planned behaviour constructs in all other samples (see Paper II, Table 3).

5.3. The effect of use of learning strategies and positive general feedback in the modified trans-contextual model

Distributional properties of the responses to all items were examined. Results revealed skewness values greater than unity, which indicated that not all variables were normally distributed. Therefore, normal scores were computed for ordinal variables before the estimation of the measurement model and the structural equation model with a maximum likelihood method (Jöreskog, Sörbom, du Toit, & du Toit, 2001). Overall means, standard deviations, and correlations for study variables are provided in Table 6.

	Μ	SD	α	1	2	З	4	5	9	L
1. Use of learning strategies	2.69	1.01	.75	I						
2. Positive general feedback	3.21	66.	88.	.30*	Ι					
3. IMPE	2.95	.82	80.	.41*	.56*	I				
4. IMLT	4.86	1.62	.91	.34*	.37*	.63*	Ι			
5. Attitudes	5.49	1.18	88.	.27*	.34*	.49*	.80*	I		
6. Perceived behavioural control	5.19	1.37	.86	.12*	.23*	.31*	.56*	.67*	I	
7. Intentions	4.73	1.57	.87	.13*	.24*	.31*	.62*	*69.	.74*	Ι
8. Leisure time physical activity	4.36	1.27	.84	60.	.28*	.27*	.50*	.53*	.53*	.72*

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<u>8. Leis</u> <u>Note. IM</u> *p<.01

The confirmatory factor analysis was used to test the factor structure of all study variables. The confirmatory factor analysis model demonstrated adequate fit with the data (Table 7, Model 1). Examining the solution estimates of these models indicated, that the factor loadings all exceeded the recommended minimums and the variance average extracted was higher than the .50 as suggested by Diamantopoulos and Sigauw (2000). 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.

 Table 7. Goodness-of fit-statistics for confirmatory factor analytic model and structural equation models.

Models	χ²	d.f.	CFI	RMSEA	CI90 RMSEA	NNFI
Model 1.	677.08	349	0.96	0.049	0.043-0.054	0.95
Model 2.	732.34	361	0.95	0.051	0.046-0.056	0.94
Model 3.	817.03	362	0.94	0.056	0.051-0.061	0.93
Model 4.	861.75	363	0.93	0.059	0.054-0.064	0.93
Model 5.	879.70	362	0.91	0.060	0.055-0.065	0.91

Note. Model 1 = Measurement model with all study variables; Model 2 = Hypothesised structural model; Model 3 = Structural equation model in which the path from intrinsic motivation in physical education to intrinsic motivation in leisure time was fixed to 0; Model 4 = Structural equation model in which the paths from attitudes and perceived behavioural control to intention were fixed to zero; Model 5. = Structural equation model in which the path from intention to physical activity was fixed to 0.

The main purpose of the structural equation modelling was to examine the effect of the perceived teacher's positive general feedback and use of learning strategies in a physical education context on students' intrinsic motivation in physical education and in a leisure time physical activity context, and also indirectly through the theory of planned behaviour constructs, to leisure time physical activity behaviour. It was proposed that students' perceptions of teachers' positive general feedback and use of learning strategies in physical education would affect intrinsic motivation in physical education directly, and also have an indirect effect on intrinsic motivation in a leisure-time context, intentions, and physical activity behaviour in leisure time. In addition, the model was constructed so that intrinsic motivation in a physical education context had a direct effect on leisure-time intrinsic motivation. An intrinsic motivation in leisure time was set to directly and indirectly predicts physical activity intention via attitudes and perceived behavioural control. Attitudes and perceived behavioural control were included as indirect predictors of physical activity behaviour in leisure-time mediated by intentions. Finally, direct effects from both perceived positive general feedback and use of learning strategies on intrinsic motivation in leisure time context, intention, and physical activity were specified as free parameters in the model, but were expected to be zero.

Fit indexes revealed that the proposed structural model reproduced the observed covariance matrix satisfactorily (Model 2, Table 7). Overall, 52% of the variance in physical activity behaviour was explained. Examining the path coefficients in the model (Figure 2), perceived teacher's positive general feedback ($\beta = 0.48, p < .01$), and use of learning strategies ($\beta = 0.27, p < .01$) in physical education predicted, as hypothesized, intrinsic motivation in a physical education context. There were no significant direct effects of perceived teacher's positive general feedback and use of learning strategies on intrinsic motivation in a leisure-time context, as specified in the hypothesized model, but there were significant indirect effects from use of learning strategies ($\beta = 0.15, p < .01$) and perceived teacher's positive general feedback ($\beta = 0.27, p < .01$) on intrinsic motivation in leisure time.

To confirm the complete mediation of the effects of positive general feedback and use of learning strategies on intrinsic motivation in leisure-time by intrinsic motivation in physical education, a mediation analysis using Baron and Kenny's (1986) criteria was performed. The use of learning strategies and perceived teacher's general positive feedback were significantly correlated with both motivation constructs satisfying the first two criteria for mediation (Table 6). The significant path from intrinsic motivation in physical education context to intrinsic motivation in leisure time context satisfied the third criterion for mediation (Figure 2). To confirm the fourth criterion, an alternative model (Table 7, Model 3) was estimated, in which the direct path from intrinsic motivation in physical education to intrinsic motivation in leisure time was fixed to zero. In this alternative model the direct effects of the use of learning strategy and perceived teacher's general positive feedback on intrinsic motivation in leisure time context were significant, indicating that complete mediation occurred. The path coefficients were $\beta = 0.27$, p < .01, and $\beta = 0.34$, p < .01, respectively. There was a significant difference in the models goodness-of-fit chi-square (($\Delta \chi^2 = 84.29$, $(\Delta df = 1, p < .01)$ between the model that included this path as a free parameter (Table 7, Model 2) and the model that did not (Table 7, Model 3).

Intrinsic motivation in a leisure time context exerted a direct influence on attitudes (β = 0.82, p < .01), perceived behavioural control (β = 0.59, p < .01), and intentions (β = 0.13, p < .01). The effects of attitudes (β = 0.31, p < .01) and perceived behavioural control (β = .49, p < .01) on intention and its effect on physical activity behaviour (β = 0.69, p < .01) were also significant. To test the mediation of the effect of intrinsic motivation in leisure time on intentions by attitudes and perceived behavioural control to intention were fixed to zero (Table 7, Model 4). Results showed that the relationship between intrinsic motivation in leisure time and intention was significantly increased from β = 0. 13, p < .01 to β = 0.73, p < .01, indicating the existence of partial mediation. There was also a significant difference in model goodness-of-fit between the model (Table 7, Model 2) that included these paths as a free parameters and the model (Table 7, Model 4) that did not (($\Delta \chi^2$ = 129.41, ($\Delta df = 2, p < .01$).



Figure 2. Hypothesized structural equation model of use of learning strategies and perceived teachers' positive general feedback in PE lesson affecting leisure-time physical activity.

Note. IM-PE – intrinsic motivation in physical education; IM-LT – intrinsic motivation in leisure time context. The paths with broken lines were set to be freed but were expected to be zero. For clarity, the indicators of the latent factors were not included. ** p < .01.

Results showed that significant direct effects of use of learning strategies and perceived positive general feedback on intention did not emerge. However, significant indirect effects of learning strategies ($\beta = 0.16$, p < .01) and perceived positive general feedback ($\beta = 0.21, p < .01$) on intention were found. The model indicated the existence of a significant direct effect ($\beta = 0.12$, $p < 10^{-1}$.01) of perceived positive general feedback on physical activity behaviour, but not for use of learning strategies. There was also a significant indirect effect of perceived positive general feedback on physical activity behaviour ($\beta = 0.14$, p < .01). To test whether the effect of perceived positive general feedback on physical activity behaviour was partially mediated via the motivational sequence, the path from intention to behaviour was fixed to zero (Table 7, Model 5). There was a significant difference in model goodness-of-fit between the model (Table 7, Model 2) that included this path as a free parameter and the model (Table 7, Model 5) that did not ($\chi^2 = 147.36$, df = 1, p < .01). The path coefficient from perceived positive general feedback on physical activity increased ($\beta = 0.30$, p < .01), indicating the existence of partial mediation. This restricted model accounted for 9% of variance in the physical activity behaviour, which is the amount of variance that can be attributed to positive general feedback.

Finally, results of the modified version of trans-contextual model showed, that the total effects of use of learning strategies ($\beta = 0.10$, p < .05) and perceived positive general feedback ($\beta = 0.20$, p < .01) on physical activity intention were indirect only via the motivational sequence. The total effect of perceived positive general feedback ($\beta = 0.26$, p < .01) on physical activity behaviour comprised both indirect and direct effects.

6. DISCUSSION

6.1. Validity and reliability of the measures and correlations between measure subscales

In Paper I the construct validity of the perceived autonomy support scale in exercise settings was supported by the results of confirmatory factor analysis models of autonomy support from physical education teachers, peers and parents. These models confirmed that perceived autonomy support scale in exercise settings is a valid instrument to measure autonomy support from different sources in Estonia with good internal consistency.

Discriminant and congeneric validity with measures were tested to establish the adequacy of the factor structures of the measures of perceived autonomy support in exercise settings from physical education teacher, parents, and peers. The fit of the congeneric model was inferior to that of the discriminant validity model and the goodness-of-fit statistics were acceptable for the discriminant validity model, but not the congeneric model. Correlations among physical education teachers, peers, and parents were significant, while perceived autonomy support from parents and peers were more strongly related compared to their association with physical education teachers. The results of Paper I (Study I) indicated that perceived autonomy support scale in exercise settings is a valid instrument to measure perceived autonomy support from physical education teachers among British school students. The results of the Estonian sample indicated, that perceived autonomy support scale in exercise settings is also a valid instrument to measure autonomy support not only from physical education teachers, but also from parents and peers, and is also suitable for use among Estonian school students. The models of British, and Hungarian sample also produced well-fitting models with items from the perceived autonomy support scale in exercise settings from three different sources: physical education teachers, peers, and parents. So it appears that the perceived autonomy support scale in exercise settings is a valid instrument to measure autonomy support from different sources with good internal consistency and exhibits very little variation in structure across cultures.

Perceived autonomy support from parent and peer sources was more strongly correlated than either of these sources with perceived autonomy support from teachers. This finding was consistent with the results of British and Hungary. Parent and peer influence usually occurs outside school and may therefore be more important supporting activity in similar contexts while physical education teachers' influence is largely connected to school contexts. Also young people are more likely to attach high value to parents' and peers' beliefs, when it comes to free time physical activity exercise, while physical education teachers autonomy support has less value, because the relationship is likely to be more distant. Recent research (Hagger, Chatzisarantis, Hein, Soós, Karsai, Lintunen, Leemans, in press) of perceived autonomy support from parents, peers and teachers autonomy support on physical activity behaviour among Estonian school students found, that perceived autonomy support from peers had only a weak effect on autonomous motivation in leisure-time context. No influence of perceived autonomy support from parents on autonomous motivation in leisure time context was followed. However, perceived autonomy support from parents influenced attitudes directly and intentions indirectly.

Average ratings of perceived autonomy support were significantly higher in the Estonian sample for the parent and peer sources compared to the British and Hungarian students. There were no differences between the British and Hungarian samples. However, there were no significant differences in perceived autonomy support when the source was physical education teacher among different cultural groups.

In Paper II the goodness-of-fit statistics for the confirmatory factor analyses model for the theory of planned behaviour constructs showed good fit, and supported the validity of study constructs. Standardized factor loadings for the latent factor on each of its indicators were all positive and significant as expected, exceeding the recommended minimum of .50 (Ford, MacCallum, & Tait, 1986). Composite reliability coefficients for physical activity behaviour. intention, attitude, perceived behavioural control, and subjective norms were satisfactory, exceeding the recommended .70 minimum. All factor correlations of the latent factors from the theory of planned behaviour were significant, whereas the correlation between subjective norms and perceived behavioural control (r= .750) and correlation between physical activity behaviour and intention (r= .713) were strongest. Also Armitage and Conner (2001) have found significant correlations between the theory of planned behaviour constructs. For example, according to their results the correlation between intention and behaviour was .47, and correlation between perceived behavioural control and behaviour = .37. In addition, they found that attitude (r = .49), subjective norm (r = .34), and perceived behavioural control (r = .43) were all to have significant correlations with intention.

In Paper III, the validity of the measurement model with the subscales of use of learning strategies, general positive feedback, intrinsic motivation in physical education and leisure time, attitude, perceived behavioural control, intention, and physical activity was supported by the results of confirmatory factor analysis. Correlations between the subscales were also significant, except between use of learning strategies and leisure time physical activity.

6.2. The effect of the components of the theory of planned behaviour on physical activity behaviour

Results from the structural equation modelling analysis indicated that student' attitudes and perceived behavioural control had a main role in predicting intention in Estonia. Further, intention predicted self-reported physical activity

behaviour, and mediated the impact of attitudes and perceived behavioural control on behaviour as suggested by Ajzen (1985). The results of this study showed no effect of subjective norms on intention among Estonian school students. The direct link between subjective norms and intentions, proposed by the theory of planned behaviour (Ajzen & Madden, 1986), assumes that the strength of intention increases as perceived social pressure increases. Research in social psychology has identified social pressure as a social factor that lessens motivation, rather than as a factor that enhances motivation (Brehm & Sensenig, 1966; Brehm & Brehm, 1981; Deci & Ryan, 1985; Festinger & Carlsmith, 1959). Therefore, the reason why subjective norms do not predict intentions may be, that social pressure, represented by the construct of subjective norms, does not always facilitate intentions. In addition, several researchers have found that subjective norms insufficiently explain social influence (Courneya, Plotnikoff, Hotz, & Birket, 2000; Grube, Morgan, & McGree, 1986), and metaanalytic review (Hagger et al., 2002a) has shown that the direct effect from subjective norms to intention is small. Trafimow and Finlay (1996) demonstrated that there might be a minority of individuals who are under normative control (i.e. individuals for whom the subjective norm-intention correlation is stronger than the attitude-intention correlation) across a range of behaviours (Norman, Clark & Walker, 2006).

The results of this study showed significant effect of attitude and perceived behavioural control on intention. Similar findings have been reported in previous meta-analyses of the theory of planned behaviour (Godin & Kok, 1996; Hausenblas, Carron, & Mack, 1997). Previous tests of the theory of planned behaviour have also provided strong evidence for the predictive validity of intentions, and have shown that attitudes and perceived behavioural control influence intentions and behaviour (Armitage & Conner, 2001; Hagger, Chatzisarantis, Biddle, 2002b). For example, in a meta-analysis conducted by Hagger et al. (2002a), the model demonstrated that attitude ($\beta = .40$, p < .01) and perceived behavioural control ($\beta = .33$, p < .01) were the best predictors of intentions.

The results presented in Paper II indicated to some variations in the relative contribution of the components of attitude and subjective norm to physical activity intention across the samples, that these did not compromise model fit in cross cultural comparison. The comparison of the path coefficients (Paper II, Table 3) showed that attitude constructs tended to be stronger in the British and Estonian samples, whereas the subjective norms constructs had a greater contribution only in the Hungarian sample, and no influence in all other samples. The effect of perceived behavioural control was significantly lower in the Hungarian sample relative to the Estonian, British, Greek and Singaporean samples. Intention-behaviour relationships exhibited invariance across the above mentioned samples.

The results of the meta-analyses, presented by Sutton (1998), indicated that the theory of planned behaviour typically explains the variance of intention between 40% and 50%, and the variance in behaviour between 19% and 38%.

A similar result of the explained variance in intention (58%) was found in the model of the presented study (see Figure1). However, in this study the explained variance of the exercise behaviour (52%) was higher in comparison with the results reported in meta-analysis.

6.3. The effect of use of learning strategies and perceived general positive feedback in modified trans-contextual model

The main purpose of the study was to investigate whether the use of learning strategies and perceived positive general feedback from the teacher influenced physical activity behaviour in a modified version of the trans-contextual model. The results of the study confirmed the hypothesis that students' perceptions of the use of learning strategies in physical education would influence their intrinsic motivation in a physical education context. Students perceiving that the use of learning strategies enabled them to learn more independently were more likely to have felt more involved in the learning process and felt more competent. Perceptions of competence are very important in physical education, because variations in physical ability level can be easily observed. Therefore, those students who feel physically competent are more likely to find physical education interesting and fun, and given the choice, will continue to participate in physical education (Ntoumanis, 2005). The adoption and use of learning strategies provided by teachers in physical education are specific instances or components of an autonomy-supportive teaching style (Reeve, 2002). In addition, involvement and competence are characteristics of intrinsic motivation, and therefore students' perceptions of learning strategies are theoretically related to intrinsic motivation. Therefore, results of this study are congruent with previous research in education, that have found the importance of more general aspects of autonomy support in facilitating autonomous forms of motivated behaviour within this context (Hagger et al., 2005; Reeve, 2002; Standage, Duda, & Ntoumanis, 2003).

The results of the study also supported previous findings in which teacher's positive general feedback significantly predicted student's intrinsic motivation in physical education context (Koka & Hein, 2003; 2005). This finding is also positively linked to the findings that have found the importance of teacher feedback on perceived competence (Amorose & Smith, 2003; Amorose & Weiss, 1998; Horn, 2004; Weiss & Amorose, 2005). This part of the model is unique, because it illustrates that specific components of an autonomy-supportive teaching style in physical education, such as the use learning strategies and perception of general positive feedback, may facilitate intrinsic motivation in physical education context.

It was also hypothesised that use of learning strategies and perceived teacher's positive general feedback would influence intrinsic motivation in a leisure-time context via the mediation of intrinsic motivation in physical education. The results indicated that the effect of use of learning strategies and perceived teacher's positive general feedback on intrinsic motivation in a leisure time context was completely mediated via intrinsic motivation in a physical education context supporting the hypothesis. This suggests that intrinsic motivation in physical education is an important and necessary factor in the process of translating the effect of teacher's behaviour, such as teaching students to use learning strategies, into intrinsic motivation in a leisure-time physical activity context. These findings support the previous results (Hagger et al., 2003; 2005), that autonomous forms of motivation can be transferred from one context to another.

The results of the present study indicate that learning strategies promote autonomous learning among students and may be viewed as a specific type of autonomy-supportive teaching behaviour. This is congruent with the findings of other studies on the role of social factors in forming autonomously regulated behaviours (Black & Deci, 2000; Ferrer-Caja & Weiss, 2000). For example, Black and Deci (2000) have demonstrated that an autonomy-supportive teacher might provide students with the necessary information about a challenging activity or task, while also encouraging them to seek other information to solve the problem in their own way. Ferrer-Caja and Weiss (2000) have also noted that when students perceive their physical education class to promote learning and participation, they focus on the behaviour within this context and evaluate their success using self-referenced sources, such as effort and improvement.

Learning strategies and perceived positive general feedback had indirect effects on physical activity intention through the motivational sequence identified in the trans-contextual model. This finding is congruent with previous tests of the trans-contextual model (Hagger et al., 2003, 2005), which demonstrated that perceived autonomy support from physical education teachers influenced students' leisure-time physical activity intention through the motivational sequence. Also recent research (Hagger, et al. 2008) confirmed that autonomy support from physical education teachers has a pervasive effect on motivation within the physical education context, but also on autonomous motivation outside of school.

The test of the modified trans-contextual model (Figure 2) indicated that the effect of intrinsic motivation in a leisure-time context on exercise intention is direct and indirect via the belief-based constructs, that determine physical activity intention in a leisure-time context, namely attitude and perceived behavioural control (Chatzisarantis, Biddle, & Meek, 1997; Hagger et al., 2005). There are many studies that have found the indirect effect of intrinsic motivation on exercise intention mediated by attitudes and perceived behavioural control (Chatzisarantis, Hagger, Biddle, & Karageorghis, 2002; Hagger & Armitage, 2004; Hagger, Chatzisarantis, Biddle, 2002b). In the present study, the indirect effect from intrinsic motivation in a leisure time

context to intentions to participate in exercise behaviour was stronger via perceived behavioural control than via attitude.

The results indicated that the perceived positive general teacher's feedback had also a direct effect on physical activity behaviour. It is, in general, consistent with the previous study conducted by Hagger et al. (2005), in which perceived autonomy support from physical education teacher, measured as a general construct, also had a direct effect on physical activity behaviour. Previous research has suggested that these significant effects may indicate more spontaneous, impulsive routes to behaviour, rather than more reflective, deliberate routes directed through intentions (Hagger et al., 2006). However, it must be stressed that the effects are generally quite small and the current study suggests that teachers high in positive general feedback in physical education should be successful in promoting students' physical activity behaviour in their leisure-time through the proposed motivational sequence.

The presented model with the specific components of perceived autonomy support explained a greater amount of variance in physical activity behaviour (52 %) than the initial trans-contextual model, where the perceived autonomy support was not differentiated (28%) (Hagger et al., 2003).

These results highlight the importance of providing positive general feedback to students in physical education classes, and teaching them how to use learning strategies to promote the intrinsic motivation in physical education and leisure-time contexts. When teachers are autonomy-supportive, they have a great opportunity to influence students' physical activity behaviour in their leisure time.

6.4. Practical recommendations

Based on the results, the modified trans-contextual model can give some practical recommendations for physical education teachers. Teachers should adopt autonomy-supportive behaviours, especially give general positive feedback and teach children how to use learning strategies. Teachers support students autonomy when they give hints how it would be easier to learn new skills. For example, the autonomy-supportive behaviour is when they say; "When you are practicing a skill, try to think how it is like something you already know", "When I'm explaining you a new skill, rehearse it in your mind", or "It might be helpful to talk yourself through the practice". Besides giving hints, teachers can support students' autonomy by giving them time to practice on their own and giving them time to communicate between themselves. When students have been taught to use learning strategies and given time to practice independently, they will likely start to rehearse the new skills and relate them to what they already know (e.g., "I try to go over in my mind the correct way to perform the skills I have learnt in physical education"). These kinds of instructional hints reflect the behaviours that students' perceive

to be autonomy-supportive and enhance intrinsic motivation to practice not only in physical education, but also in their leisure-time.

6.5. Limitations of the study

Although the present study provided some interesting findings about the influence of specific components of physical education teachers' autonomysupportive behaviours on students' leisure-time physical activity behaviour, there are also some limitations that must be acknowledged. The sample had a greater number of female than male participants because there were usually more females than males in the classes that participated in the study. However, studies using constructs from the self-determination theory in physical education contexts, have consistently supported the invariance of relations among some components of the trans-contextual model across gender, meaning that the pattern of relationships among the model constructs are largely the same for both boys and girls (Standage, Duda, & Ntoumanis, 2005; 2006). Another limitation of the current study is that the modified version of the transcontextual model did not include need-related constructs from the selfdetermination theory, such as psychological needs for competence, autonomy, and relatedness as important mediators between autonomy-supportive behaviours and motivation (Ryan & Deci, 2000). Thus, further extension of the model through the inclusion of these needs may help to provide a more complete understanding of the motivational processes predicting physical activity intention and behaviour. Also there may be other specific types of autonomy-supportive behaviours that affect students' motivation in both contexts.

7. CONCLUSIONS

- 1. Perceived autonomy support scale for exercise settings is a valid instrument to measure autonomy support from three different sources: physical education teachers, peers, and parents among Estonian, Hungarian, and British school students.
- 2. The validity of the components of the theory of planned behaviour was acceptable to predict physical activity among young people in different cultural groups.
- 3. Students' perceived use of learning strategies in physical education context positively influenced intrinsic motivation in physical education context.
- 4. Students' perceived use of learning strategies and perceived teacher's positive general feedback significantly influenced intrinsic motivation in leisure time context via intrinsic motivation in physical education.
- 5. Intrinsic motivation in leisure time context predicts physical activity behaviour via attitudes, perceived behavioural control, and physical activity intention.
- 6. The total effects of perceived use of learning strategies and perceived positive general feedback on physical activity intention were indirect via the motivational sequence.
- 7. The total effect of perceived positive general feedback on physical activity behaviour comprised both indirect and direct effects.

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SUMMARY IN ESTONIAN

Sotsiaal-kognitiivsete motivatsiooni mudelite komponendid kooliõpilaste kehalise aktiivsuse prognoosimisel

Kehalise aktiivsuse valdkonnas on üha enam hakatud uurima psühholoogiliste tegurite mõju kehaliste harjutustega tegelemisele. Selliste psühholoogiliste tegurite uurimiseks, mis on seotud õpilaste motivatsiooniga tegeleda kehaliste harjutustega nii kooli kehalises kasvatuses kui ka vabal ajal on Hagger'i jt., (2003) poolt välja töötatud trans-kontekstiline motivatsiooni mudel, mis hõlmab komponente enesemääratlemise teooriast (Deci & Ryan, 1985) ja planeeritud käitumise teooriast (Ajzen, 1985). Uuringud trans-kontekstilise motivatsiooni mudeli valdkonnas (Hagger jt., 2003; Hagger jt., 2005) on näidanud kehalise kasvatuse õpetaja autonoomsuse toetuse tajumise mõju õpilaste motivatsioonile kehalises kasvatuses ja kehaliste harjutustega tegelemiseks vabal ajal, mis hoiakute, tajutud käitumise kontrolli ja kavatsuse kaudu tegeleda kehaliste harjutustega vabal ajal avaldas mõju kehalisele aktiivsusele väljaspool kooli. Eelnevates uuringutes vaadeldi tajutud õpetaja autonoomsuse toetust kui üldist, mis ei kajastanud selle spetsiifilisi komponente.

Käesolev töö koosneb kolmest uuringust. Esimeses ja teises uuringus hinnati sotisaal-kognitiivsete motivatsiooni mudelite komponentide valiidsust. Kahes uuringus osales 268 kooliõpilast, nendest 117 poeglast ja 151 tütarlast, keskmise vanusega 15,04 \pm 0,91. Uuringutest selgus, et kehalise kasvatuse, vanemate ja eakaaslaste tajutud autonoomsuse toetuse küsimustike kui ka planeeritud käitumise teooria konstruktide psühhomeetrilised parameetrite väärtused olid aktsepteeritavad. Teise uuringu tulemused näitasid, et Eesti kooliõpilaste hoiakud ja tajutud käitumise kontroll avaldavad mõju kehaliselt aktiivsele käitumisele kehaliste harjutustega tegelemise kavatsuse kaudu.

Kolmanda uuringu eesmärk oli selgitada kehalise kasvatuse õpetaja autonoomsuse toetuse tajumist iseloomustavate spetsiifiliste komponentide mõju kehalisele aktiivsusele vabal ajal trans-kontekstilise motivatsiooni mudeli kaudu. Antud uurimuses tajutud autonoomsuse toetuse spetsiifilised komponendid iseloomustavad õpetaja tegevust, mis on seotud õpilastele õpistrateegiate kasutamise õpetamisega ja üldise positiivse tagasiside andmisega.

Uuringus osales 399 kooliõpilast, nendest 123 poeglast ja 276 tütarlast, keskmise vanusega 14,98 \pm 1,43. Uuring viidi läbi kolmes etapis. Esimesel etapil vastasid õpilased küsimustikule, mis hõlmas küsimusi motivatsiooni kohta kooli kehalises kasvatuses ja õpetaja autonoomsuse toetuse tajumist iseloomustavate spetsiifiliste komponentide kohta. Teises etapis, mis viidi läbi nädal aega hiljem samade õpilaste hulgas, vastati küsimustele planeeritud käitumise teooria komponentide ja motivatsiooni kohta tegeleda kehaliste harjutustega vabal ajal. Neli nädalat hiljem läbiviidud küsimustik hõlmas

küsimusi kehaliste harjutustega tegelemise kohta vabal ajal viimase nelja nädala jooksul.

Trans-kontekstilise motivatsiooni mudelist selgus, et tajutud autonoomsuse toetuse spetsiifilised komponendid mõjutavad õpilaste sisemist motivatsiooni kehaliste harjutustega tegelemiseks vabal ajal kehalise kasvatuse sisemise motivatsiooni kaudu. Sisemine motivatsioon kehalises kasvatuses mõjutab sisemist motivatsiooni kehaliste harjutustega tegelemiseks vabal ajal, mis omakorda mõjutab kavatsust kehaliseks tegevuseks nii otseselt kui ka läbi hoiakute ja tajutud käitumise kontrolli. Kavatsus tegeleda kehaliste harjutustega vabal ajal mõjutab tugevalt kehaliselt aktiivset käitumist. Sisemine motivatsioon kehaliste harjutustega nii otseselt kui ka hoiakute ja tajutud käitumise kontrolli kaudu. Üldise positiivse tagasiside ja õpistrateegiate kasutamise tajumine mõjutas kaudselt kavatsust tegeleda kehaliste harjutustega. Üldisel positiivsel tagasiside tajumisel oli kehaliselt aktiivsele käitumisele nii otsene kui kaudne mõju.

Käesoleva uurimistöö tulemused näitasid, et õpetajatel on oluline anda õpilastele üldist positiivset tagasisidet ja õpetada, kuidas kasutada õpistrateegiaid, et suurendada nende sisemist motivatsiooni tegutsemiseks kehalises kasvatuses ja selle kaudu mõjutada ka kehalist aktiivsust vabal ajal.

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