STUDIES IN SPORT, PHYSICAL EDUCATION AND HEALTH
170

Sami Yli-Piipari

The Development of Students' Physical Education Motivation and Physical Activity

A 3.5-Year Longitudinal Study across Grades 6 to 9

JYVÄSKYLÄN YLIOPISTO

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Esitetään Jyväskylän yliopiston liikunta- ja terveystieteiden tiedekunnan suostumuksella
julkisesti tarkastettavaksi yliopiston vanhassa juhlasalissa S212
kesäkuun 3. päivänä 2011 kello 12.

Academic dissertation to be publicly discussed, by permission of
the Faculty of Sport and Health Sciences of the University of Jyväskylä,
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UNIVERSITY OF JYVÄSKYLÄ

JYVÄSKYLÄ 2011

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Editor
Harri Suominen
Department of Health Sciences, University of Jyväskylä
Pekka Olsbo, Sini Tuikka
Publishing Unit, University Library of Jyväskylä

URN:ISBN:978-951-39-4321-9
ISBN 978-951-39-4321-9 (PDF)

ISBN 978-951-39-4311-0 (nid.)
ISSN 0356-1070

Jyväskylä University Printing House, Jyväskylä 2011

ABSTRACT

Yli-Piipari, Sami
The Development of Students' Physical Education Motivation and Physical Activity: A 3.5-Year Longitudinal Study across Grades 6 to 9
Jyväskylä: University of Jyväskylä, 2011, 107 p. (+ included articles)
(Studies in Sport, Physical Education, and Health
ISSN 0356-1070; 170)
ISBN 978-951-39-4311-0 (nid.), 978-951-39-4321-9 (PDF)
Finnish summary
Diss.

The purpose of this study was to investigate the development of, and gender differences in, students' physical activity, and their expectancy-related beliefs, task values and motivational regulations in physical education across Grades 6 to 9. In addition, the longitudinal relationship between students' physical education motivation and development of physical activity was investigated. A total of 812 (382 girls, 430 boys) 11- to 13-year-old Finnish adolescents from 17 elementary and eight middle schools were followed across six measurements. The participants filled in questionnaires on their self-reported physical activity, and their expectancy-related beliefs, task values, and motivational regulations in physical education. Latent growth curve modeling found, first, that students' physical activity and expectancy-related beliefs toward physical education declined across Grades 6 to 9 while their valuing of tasks in physical education remained unchanged. The transition from elementary school Grade 6 to middle school Grade 7 moderated the growth of students' expectancy-related beliefs and task values, accelerating the decline of expectancy-related beliefs and temporarily increasing task values. However, students' intrinsic and extrinsic motivation toward physical education increased moderately across Grades 6 to 9. Second, although boys reported constantly higher levels of physical activity, expectancy-related beliefs, and extrinsic motivation than girls, the development of physical activity and physical education motivation between the genders was similar. However, gender differences in task values increased during middle school, with boys attributing greater value than girls to physical education tasks. Third, growth mixture modeling showed that the students who had the lowest levels and the most negative development of expectancy-related beliefs and task values experienced the steepest decline in their physical activity. In addition, the students who valued physical education highly and experienced an increase in their expectancy-related beliefs toward physical education became more physically active across time. This study showed that although the majority of the students were motivated toward physical education, their physical activity decreased across time. This study suggests that school physical education may foster students' physical activity if their expectancy-related beliefs can be supported, particularly if students value school physical education.

Keywords: physical activity, physical education, beliefs, values, self-determination, latent growth curve modeling

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ACKNOWLEDGEMENTS

During this endeavor I have been very fortunate to be a part of a first-rate research group. I wish to express my deepest gratitude to my supervisors Professor Jarmo Liukkonen and Lecturer, Docent Timo Jaakkola. Jarmo has led the present research project and I am intensely grateful for the opportunities and advice he has given me during this process. I am indebted also to my second supervisor, Timo, who supervised my Master's thesis and encouraged me to embark on my PhD work. His guidance and encouragement has been highly valuable during the work of writing this dissertation. I would also like to express my warmest thanks to the examiners of this dissertation Professors Ang Chen and John Wang for their valuable comments.

I was fortunate enough to spend the last year of my PhD study as a Fulbright scholar at the University of North Carolina at Greensboro. I want to thank my Fulbright supervisor Professor Catherine Ennis for her invaluable help not only during my actual dissertation work but also, and especially, for guiding my academic growth. I am also grateful to Professor Denis Pasco for being my friend and a person to talk to during our year in the US.

I was extremely happy for the cross-campus support I have received from the University of Jyväskylä. I am deeply grateful to Professor Jari-Erik Nurmi. His advice has been inestimable in terms of my academic advancement. I would also like to thank Professor Esko Leskinen for answering my questions when I was pushing my boundaries and Dr Noona Kiuru for bearing with me during the very early months of my academic career. I want to thank my department at the University of Jyvaskyla and my many congenial colleagues. I have been lucky to share an office with great group of colleagues: at the University of Jyvaskyla with Kiran Kamat PhD and Bela Pavelka PhD, and at Greensboro with Tan Zhang PhD, and graduate students Senlin Chen, Deoccki Hong, Jerry Loflin, and Yioannis Syrmpas.

Last but not least I would like to thank my family during this PhD period, and of course, throughout my life. My parents Marja-Leena and Juhani, and Laurie and Raine have given me their unconditional support and encouragement. Finally, I want to thank my wife Karita and my children Saray and Niklas. I hope they know that my long hours of work have been done because of you.

Jyväskylä 26.4.2011
Sami Yli-Piipari

ORIGINAL ARTICLES

This dissertation is based on the following original papers, which are referred to in the text by their roman numerals:

I. Yli-Piipari, S., Liukkonen, J., Jaakkola, T., Watt, A., & Nurmi, J-E. (2009). Relationships between physical education students' motivational profiles, enjoyment, state anxiety, and self-reported physical activity. *Journal of Sport Science and Medicine, 8*, 327 – 336.

II. Yli-Piipari, S., Kiuru, N., Jaakkola, T., Liukkonen, J., & Watt, A. (2011). The role of peer groups in male and female adolescents' task values and physical activity. *Psychological Reports, 108,* 75-93.

III. Yli-Piipari, S., Jaakkola, T., & Liukkonen, J. (2010). Gender specific developmental dynamics between physical education task values and physical activity during junior high school. *Sport Science Review, 19*, 231 – 246.

IV. Yli-Piipari, S., Leskinen, E., Liukkonen, J., & Jaakkola, T. Predictive role of physical education motivation: The developmental trajectories of physical activity during grades 7-9 (submitted in *Research Quarterly for Exercise and Sport*).

V. Yli-Piipari, S., Liukkonen, J., Jaakkola, T., & Nurmi, J-E. The development of students' physical education motivation in physical activity: A growth mixture modeling approach (submitted in *Journal of Sport and Exercise Psychology*).

In addition, some previously unpublished results are presented.

CONTENTS

1 INTRODUCTION

A physically active lifestyle offers children and adolescents multiple psychological health benefits and has a positive effect on academic performance and learning (see review by Strong et al., 2005). Physical inactivity in turn relates to higher mortality from all major causes (Pate et al., 1995) as well as increased body fat and obesity (Koezuka et al., 2006). Regardless of such impressive health benefits, numerous reports have documented that children and adolescents do not engage in sufficient activity for health purposes (Pate et al., 2006; Strong et al., 2005). In addition, previous longitudinal research has shown a significant decrease in physical activity with increasing age from childhood to adolescence in the industrialized countries (e.g., Currie et al., 2008).

Physical education has become institutionalized in schools in Finland and other developed countries (Pühse & Gerber, 2005), and it is highly recommended as a setting for increasing physical activity (Kahn, Ramsey, & Brownson, 2002; McKenzie, 2007; Morgan, Beighle, & Pangrazi, 2007; Pate et al., 2010). Physical education is the only structured setting where it is possible to ensure that *all* children can engage in vigorous physical activity. It is also a setting in which they can be taught important generalizable movement skills (McKenzie & Lounsbery, 2009). Previous research has found students' physical education motivation to be linked with subsequent physical activity by suggesting more autonomous motivation corresponds to transfer of behavior across contexts (Cox, Williams, & Smith, 2007; Ferrer-Caja & Weiss, 2002; Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003; Shen, McCaughtry, & Martin, 2008). Furthermore, scholars have advocated field-based studies to examine how motivation-related processes toward physical education predict actual physical activity patterns (Cox et al., 2007; Ferrer-Caja & Weiss, 2002; Hagger et al., 2003; Shen et al., 2008; Standage, Gillion, & Treasure, 2007). This study is one of the few longitudinal studies to examine the development of students' physical activity and physical education motivation. In addition, this study extends the previous findings by investigating the longitudinal relationships between physical education motivation and the development of physical activity.

2 REVIEW OF THE LITERATURE

2.1 Definition of physical activity

Physical activity is a broad term used to refer to:

> Any bodily movement produced by skeletal muscles that result in energy expenditure (Caspersen, Powell, & Christenson, 1985, 243)

Physical activity may encompass activities for leisure or fitness, with an objective such as enhancing fitness, health, or social interaction (Armstrong, Bauman, & Davies, 2000). In the everyday life of an adolescent, the opportunities for physical activity consist mainly of active commuting to school, physical education, and physical activity during recess and leisure-time, participation in sports, and unorganized physical activity. Physical activity is characterized by its intensity, frequency and duration, and it can be seen as a continuum from physical inactivity to extreme activity (Shephard, 2003). The intensity of physical activity may be expressed in absolute terms, such as an absolute expenditure relative to body mass or resting metabolism, or as a value relative to peak performance, whereas frequency is usually expressed as the number of times a given activity is performed during a week. Information about the duration of individual exercise sessions may be combined with frequency data to indicate the total number of minutes of activity accumulated — for example, during a typical recent week (Shephard, 2003). In this study, physical activity was operationalized as daily moderate to vigorous physical activity as described in the Health Behaviour in School-Aged Children study (HBSC) commissioned by the World Health Organization (Booth, Okely, Chey, & Bauman, 2001).

Adolescent physical activity is influenced by a multitude of psychological, biological, social, cultural, and environmental factors that may subsequently affect an individual's decision to adopt and maintain a physically active lifestyle (Buckworth & Dishman, 2002). Previous research on adolescence has shown gender (male), ethnicity (white), age (inverse), perceived ability competence, intentions, depression (inverse), previous physical activity, community

sports, sedentary after school and on weekends (inverse), parent support, support from others, sibling physical activity, and opportunities to exercise to consistently associate with positive physical activity levels (see review by Sallis, Prochaska, & Taylor, 2000). In addition, competence and self-determined motivation in physical education have been found directly or indirectly to predict leisure-time physical activity (Cox et al., 2007).

The current recommendation for physical activity in Finland reports that elementary school children should engage in moderate to vigorous physical activity for at least two hours daily and middle school students for at least 90 minutes daily (Ahonen et al., 2008). The recommendation in the US is similar, suggesting that school-aged youth engage in moderate to vigorous physical activity at least one hour daily to promote health (US Department of Health and Human Services, 2008; Strong et al., 2005). However, the number of adolescents who do not meet the recommendation is alarmingly high. In the HBSC study, which covered 41 countries, the proportion of adolescents who reported not meeting the recommendation for physical activity varied from 65– 95% and 49–86% in 13-year-old girls and boys respectively (Currie et al., 2008). In Finland, 85% of girls and 76% of boys did not meet the physical activity recommendations at age 13. In addition, research has shown a drop-off in moderate to vigorous physical activity occurs among in US youth aged 9 to 15 years (Nader, Bradley, Houts, McRitchie, & O'Brien, 2008) and among Finnish youth between 12 and 15 years (Telama et al., 2005). In sum, a great number of adolescents are currently not sufficiently physically active with regard to the maintenance of good health (Currie et al., 2008).

Enhancing children's and adolescents' physical activity is important because previous studies have found that physical activity habits acquired early in life may persist into adolescence (Malina, 2001; Telama, Yang, Laakso, & Viikari, 1997; Telama et al., 2005; Trudeau, Shephard, Arsenault, & Laurencelle, 2003) and that physical activity provides immediate health benefits (Gidding, 2007). For example, childhood habitual physical activity reduces the risk of cardiovascular disease, overweight, and type 2 diabetes. Furthermore, vigorous activity helps increase the strength and density of bones. Improvements in flexibility, muscular strength, and bone health not only advance movement and sport-related performance, but are also thought to be related to reduced back pain and fractures in adulthood (Malina, Bouchard, & Bar-Or, 2004; Riddoch, 1998). Vigorous physical activity may also help improve psychological health and mood and it can assist in reducing blood pressure and increasing high-density lipoprotein-cholesterol among high-risk adolescents (Strong et al., 2005).

2.1.1 Development of physical activity

Descriptive epidemiological studies of physical activity in children and adolescents have consistently indicated an inverse association of physical activity with age (Caspersen, Pereira, & Curran, 2000; Currie et al., 2008; Duncan, Duncan, Strycker, & Chaumeton, 2007; van Mechelen, Twisk, Post, Snel, & Kemper, 2000; Sallis et al., 2000; Telama & Yang, 2000; Telama et al., 1997; Telama et al., 2005;

Trost et al., 2002). In addition, cross-sectional and longitudinal studies of habitual physical activity during childhood and adolescence have revealed that regular exercise diminishes with age. A recent meta-analysis reviewed longitudinal studies of adolescents' physical activity, documenting that 22 longitudinal studies out of the total of 26 conducted between years 1977 and 2010 revealed a reduction in physical activity across ages nine to 18 (Dumith, Gigante, Domingues, & Kohl, 2011). An impressive series of studies by Telama et al. (2000, 1997, 2005) found a decrease in physical activity from childhood through adolescence in a Finnish population. For instance, in a longitudinal study, Telama and Yang (2000), investigating Finnish adolescent physical activity between the ages of nine to 27, found a notable decline in physical activity levels after the age of 12. Similar results have been obtained across the western countries. For example, in their cross-sectional study with more than 10,000 American adolescents, Caspersen et al. (2000) found that regular vigorous physical activity patterns declined consistently from ages 12 through 21; this decline, however, peaked between ages 15 and 18 years. Similarly, Trost et al. (2002) reported a significant inverse relationship with age and daily moderate and vigorous physical activity level in students up to Grade 12. In addition, van Mechelen et al. (2000), in a 15-year longitudinal study of almost 200 Dutch young people, found a significant decline in the time spent on moderate levels of physical activity between the ages of 13 and 27 years. Finally, in an examination of the growth trajectories of 12- to 17-year-old adolescents, Duncan et al. (2007) reported a decrease in physical activity, with individuals' physical activity behavior becoming increasingly similar across time. This declining trend has resulted in the fact that only 34% of European young people aged 11, 13, and 15 years reported enough physical activity to meet current guidelines (Currie et al., 2008). Similar findings have been reported in the US, with girls falling below the recommendations at approximately 13.1 and boys at 14.7 years of age (Nader et al., 2008).

Research has consistently indicated boys to be physically more active than girls (Caspersen et al., 2000; Currie et al., 2008; Duncan et al., 2007; van der Horst, Paw, Twisk, & van Mechelen, 2007; van Mechelen et al., 2000; Nader et al., 2008; Riddoch et al., 2004; Tammelin, Ekelund, Remes, & Näyhä, 2007; Telama & Yang, 2000). Nevertheless, gender differences in the age-related decline in physical activity among adolescents have continued to be been a controversial topic. For example, Sallis (1993) reported a greater rate of decline in physical activity for girls. Other studies (Caspersen et al., 2000; van Mechelen et al., 2000; Telama & Yang, 2000) have indicated that the rate of decline is higher in boys. First, Telama and Yang (2000) reported that although boys were generally more active than girls in physical activity and sport participation, the decline in physical activity and sport participation was more substantial among boys than girls, and that after the age of 15 years girls engaged in leisure-time physical activity more frequently than their male counterparts. However, they found the decline in physical activity to be steeper in boys than in girls after the age of 12, with the steepest decline occurring between the ages of 12–15 in boys and 15–18 in girls. Second, Caspersen et al. (2000) found that males showed a greater de-

cline than females in regular, vigorous physical activity between the age of 12 and 21 years. A similar pattern was also found by van Mechelen et al. (2000) among Dutch young people. In addition, a few recent studies have found gender similarities in the development of adolescent physical activity. Duncan et al. (2007) reported boys to have higher levels of physical activity than girls, but found no gender differences in the development of physical activity trajectories. Furthermore, although Nader et al. (2008) found boys to be more active than girls, their rate of decline in physical activity behavior was similar.

2.2 School physical education

Physical education is a compulsory part of the school curriculum in most western countries (Hardman, 2008; Pühse & Gerber, 2005). In Finland, physical education is a part of the school curriculum mandated by Finnish Ministry of Education and Culture. Finnish school physical education has the general lifelong educational objective both to promote students' physical, psychological, social, and ethical growth and well-being, and to guide them toward lifelong physical activity (Finnish National Board of Education, 2004, 2007). Specifically, school physical education aims to enhance students' competency in motor skills and movement patterns, and promote a physically active life-style and physical fitness, responsible personal and social behavior, appropriate values, and enjoyment of, and self-expression in, physical activity. The Finnish physical education curriculum is similar to that in other western countries, with the dominance of activities such as ball games, gymnastics, fitness training, and track and field. The main variation, however, concerns the inclusion of activities representative of Nordic culture, such as skiing, skating, orienteering, and outdoor education (Annerstedt, 2008). Furthermore, the objectives of Nordic physical education have been found to relate more to cooperation, socialization, and team effort than physiology, competitions, and results, as observed in other western countries (Annerstedt, 2008). Finally, health is a critical aspect of the Finnish curriculum, and is supported by continuous attention to providing the skills and knowledge associated with lifelong engagement in physical activity (Heikinaro-Johansson, Johansson, & McKenzie, 2007).

The Finnish educational system is in many respects similar to the systems in most other European countries and in the US. In Finland, children start their compulsory comprehensive school during the year they reach seven years of age. Comprehensive school divides into a lower level (elementary school grades one to six) and an upper level (middle school grades seven to nine). Up to age 15 all Finnish adolescents have a similar basic education. In elementary school, children study different school subjects in their own classes, whereas in middle school subject-specific classes are very widely used. However, across elementary and middle school physical education classes are normally formed of two ordinary classes. For instance, students in grades 7A and 7B physical education is taught in separate single-gender classes. These classes have two 45 minutes

lessons of obligatory physical education weekly, most typically in the form of one 90-minute lesson. In middle school the amount of weekly physical education is also 90 minutes. During grades seven to nine students can choose to take voluntary physical education courses; availability is determined by the local school curriculum. In the US, the National Association for Sport and Physical Education recommends that elementary schools provide 150 minutes of physical education per week and that secondary schools provide 225 minutes, with some instruction being offered every day (Burgeson, Wechsler, Brener, Young, & Spain, 2001; National Association for Sport and Physical Education, 2010). It is noticeable that in Finland the majority of schools have single-gender physical education throughout grades one to nine.

2.3 Physical education motivation

Physical educators, as educators in general, are concerned with motivation. The term motivation is derived from the Latin verb *movere* (to move) and there are many definitions of motivation and much disagreement over its precise nature. There is a long history of psychological theories that have been used to explain behavior in achievement contexts. The research focus has shifted during the last few decades from observable behavior to psychological variables, such as beliefs, values, and goals that can be interfered but cannot be directly observed from behavior (Stipek, 2002). Lately, the strongest focus has been on social-cognitive theories that view learning as involving interactions among individuals' cognitions and behaviors, and features of the environment (Perry, Turner, & Meyer, 2006).

Behavioral theories originated in the nineteen fifties view of motivation as a change in the rate, frequency, or form of response (behavior) as function of stimuli (Skinner, 1953). According to the behaviorist theories, reinforcing consequences makes behavior more likely to occur in the future, whereas punishing consequences make behavior less likely (see review by Schunk, Pintrich, & Meece, 2008). On the other hand, cognitive motivation theories stress the causal roles of mental structure and the processing of information and beliefs. Cognitive models also include the concept of reinforcement, but portray its effects as mediated through learners' cognitions (Perry et al., 2006; Stipek, 2002). In cognitive terms, the degree to which students can be motivated by a reinforcer depends on their expectations. In addition, the key in motivating behavior is the extent to which learners value the reinforcer (Perry et al., 2006). In addition, contemporary social cognitive theories of motivation assume these cognitive learning processes to be influenced by cognitive processes present in and promoted by classrooms and the broader environment (Perry et al., 2006). In other words, social cognitive approaches incorporate constructs concerning individuals' expectations and values, but expand the original cognitive framework by highlighting how students reconcile the personal and social to judgments about

likely outcomes and to values associated with tasks and outcomes (Wigfield & Eccles, 2002).

To assess students' physical education motivation this study conceptualized physical education motivation by drawing on two prominent social cognitive theories: the modern expectancy-value theory (Eccles et al., 1983) and the self-determination theory (Deci & Ryan, 1985). The modern expectancy-value theory has been found to be a useful framework when examining school-based motivation and it has generated most of the research on academic achievement in classroom settings (see review by Schunk et al., 2008). Xiang et al. (Xiang, McBride, & Bruene, 2004a; Xiang, McBride, & Bruene, 2006; Xiang, McBride, & Guan, 2004b; Xiang, McBride, Guan, & Solmon, 2003) have conducted a few studies using the theory as a framework to understand elementary school students' motivation in the physical education context. In addition, intrinsic motivation has been found to be an important antecedent determining individual behavior (Deci & Ryan, 2000). Thus, the self-determination theory has been strongly recommended as a suitable framework for understanding physical activity (Biddle & Nigg, 2000; Landry & Solmon, 2002; Ryan, Williams, Patrick, & Deci, 2009) and has been utilized in various studies of physical education in various cultures (see review by Hagger & Chatzisarantis, 2007; Jaakkola, Liukkonen, Laakso, & Ommundsen, 2008). Moreover, some consistent evidence has been found of the utility of the self-determination theory in predicting physical activity behavior change (Fortier & Kowal, 2007).

2.3.1 The modern expectancy-value theory

The modern expectancy-value theory (e.g., Eccles et al., 1983; Eccles & Wigfield, 2002; Wigfield & Eccles, 1992) is based on Atkinson's (1964) expectancy-value model linking achievement performance, persistence, and choice most directly to individuals' expectancy-related beliefs and task values. The expectancy-value model was first introduced with school-aged children in academic domains (Eccles et al., 1983). Later this model was expanded to investigations with college students on course performance and future enrollment intentions (Bong, 2001), and with children in youth sport and physical education (Cox & Whaley, 2004; Gao, Lee, Solmon, & Zhang, 2009; Gao & Xiang, 2008; Rodriguez, Wigfield, & Eccles, 2003; Xiang et al., 2004a; Xiang et al., 2006; Xiang et al., 2004b). The expectancy-value theory emphasizes two theoretical concepts: expectancy-related beliefs and subjective task values (Eccles et al., 1983; Wigfield & Eccles, 2000). Expectancy-related beliefs and values are assumed to be influenced by judgements of competence, perceptions of the difficulty of different tasks, and individuals' goals and self-schema. These social cognitive variables, in turn, are influenced by individual perceptions of other peoples' attitudes and expectations, by affective memories, and by interpretations of previous achievement outcomes. Individual task perceptions and interpretations of past outcomes are assumed to be influenced by socializers' behavior and beliefs (Figure 1) (Eccles et al., 1983; Wigfield & Eccles, 2000).

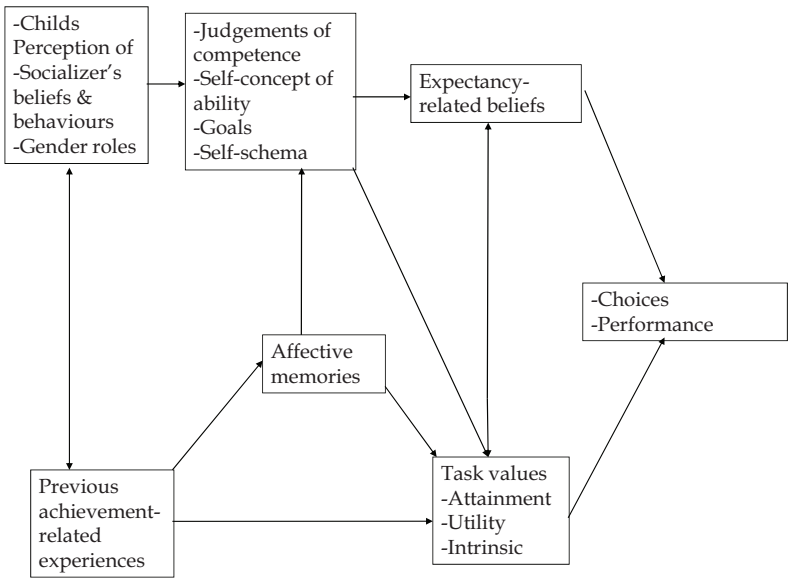


FIGURE 1 Theoretical framework of the modern expectancy-value theory (Eccles & Wigfield, 2002)

Eccles et al. (1983) defined expectancy-related beliefs as individuals' evaluations of their competence in different areas and beliefs about how well they will perform on upcoming tasks. These ability/competence beliefs are similar constructs as Harter's (1998) perceptions of competence, which Harter described as cognitive representations of the level of one's ability. These expectancy-related beliefs, in turn, are similar to Bandura's (1997) personal efficacy expectations, which Bandura refined as individuals' confidence in their ability to organize and execute a given task. However, by combining these dimensions, Eccles et al. specified these expectancy-related beliefs in relation to different tasks or, more broadly, to different contexts.

To specify these tasks, Eccles et al. (1983) outlined four components of task value: attainment value, utility value, intrinsic value, and cost. They defined attainment value as the personal importance of performing well on the task at hand. They also linked attainment value to the relevance of engaging in a task for confirming or disconfirming salient aspects of one's self-schema. Intrinsic value is the enjoyment the individual gets from performing the activity or the subjective interest the individual has in the subject. Utility value is determined by how well a task relates to current and future goals, such as career goals. A task can have positive value to a person because it facilitates important future goals, even if he or she is not interested in the task for its own sake. For instance, students often take classes they do not particularly enjoy, but they need to take to pursue other interests, such as to please their parents, or to be with their friends. This component captures more extrinsic reasons for engaging in a task

(Deci & Ryan, 1985; Harter, 1981). However, it also relates directly to an individual's internalized short- and long-term goals. Finally, Eccles and her colleagues identified cost as a critical component of value (Eccles et al., 1983). Cost is conceptualized in terms of the negative aspects of engaging in the task, such as performance anxiety and fear of both failure and success, as well as the amount of effort needed to succeed and the lost opportunities that result from making one choice rather than another. However, the empirical studies conducted by Eccles and colleagues have focused solely on the first three of these characteristics (Eccles et al., 1983; Fredricks & Eccles, 2002; Wigfield & Eccles, 1992, 2000). Cost has received less research attention and it is not examined in the present investigation.

2.3.2 Expectancy-related beliefs, task values, and physical activity

The modern expectancy-value theory postulates expectancy-related beliefs and task values to mediate relations of multiple social factors and cognitive processes with achievement-related behavioral outcomes (Schunk et al., 2008). The results have shown in sport and physical education that expectancy-related beliefs and subjective task values are crucial factors in predicting students' achievement outcomes, such as effort, persistence, performance, and choice (Cox & Whaley, 2004; Gao et al., 2009; Gao & Xiang, 2008; Xiang, Chen, & Bruene, 2005; Xiang et al., 2004a, 2006; Xiang et al., 2004b). For example, Cox and Whaley (2004) found that 14- to 19-year-old high school student athletes' expectancies and task values were positively associated with their effort and persistence in basketball. Similar results have occurred in the weight training context, where high expectancy-related beliefs and task values were positive predictors of 18- to 27-year-old undergraduate students' intention for future participation and engagement in the class (Gao & Xiang, 2008). In addition, Xiang et al. (2004a, 2006, 2004b) reported on the association between 7- to 10-year-old elementary school children's intentions for future participation in physical education and their corresponding subjective task values.

Eccles and her colleagues have posited that expectancy-related beliefs and subjective task values are positively related to each other (Eccles et al., 1983; Eccles, Wigfield, & Schiefele, 1998). In other words, individuals tend to perceive the activity at hand as more important, interesting, and useful if they do well and believe they are competent in the activity. Recent empirical research on this relationship has supported this notion in the context of sport and physical education (Eccles & Harold, 1991; Xiang et al., 2004b), showing that students' expectancy-related beliefs and expectancies for success in different tasks play a prominent role in their motivation to perform these tasks, and that subjective task values are important determinants of task choice, intention for future participation, and of effort and persistence (Cox & Whaley, 2004; Eccles & Harold, 1991; Xiang et al., 2005; Xiang et al., 2006, 2004b).

2.3.3 Development of expectancy-related beliefs and task values

Research examining developmental differences in children's expectancy-related beliefs during their school years has consistently shown a decrease in mean levels of school-related expectancy beliefs as children move into adolescence (Eccles & Migley, 1989; Eccles et al., 1998; Wigfield, Eccles, & Pintrich, 1996). These studies have indicated the following pattern over time. First, expectancy-related beliefs become increasingly differentiated so that children have quite specific competence beliefs for different domains and this process begins quite early during the elementary school years (Eccles, Wigfield, Harold, & Blumenfeld, 1993; Eccles et al., 1998). Second, these expectancy-related beliefs become increasingly stable, when stability is assessed by correlating these beliefs over time (Eccles et al., 1989; Wigfield et al., 1997). Third, adolescents' expectancy-related beliefs generally decline throughout the elementary and middle school period (Frederics & Eccles, 2002; Wigfield & Eccles, 2002).

A few studies on developmental trends in academic task values have been conducted during the middle school transition. In a 3-year longitudinal follow-up to the study by Eccles et al. (1993), Wigfield et al. (1997) showed that children's physical education task values differentiated early on, became more stable over time, and declined across the elementary school years. Analyses of the data from the middle school transition study showed that these declines often continued into middle school and that the most marked changes occurred immediately after the middle school transition (Eccles et al., 1989; Wigfield, Eccles, MacIver, Reuman, & Migley, 1991). In addition, work with 10-year longitudinal data showed that task values toward school sports decrease during the elementary school years, but this decline leveled off during middle school (Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002). In addition, using the same 10-year longitudinal data, Fredricks and Eccles (2002) found students' interest (intrinsic value) and importance (attainment value) in school sports to decrease across elementary and middle school.

In much of the research using the model proposed by Eccles et al. (1983) there has been a strong emphasis on the role of gender differences in expectancy-related beliefs and task values as potential moderators in achievement choices (e.g., Eccles et al., 1993; Wigfield et al., 1997). Research has shown boys to hold higher ability beliefs and expectancies for success in the most traditional sport activities and physical education than girls (Eccles & Harold, 1991; Eccles et al., 1993; Fredricks & Eccles, 2002; Gao & Xiang, 2008; Jacobs et al., 2002; Wigfield et al., 1997; Xiang et al., 2003). However, some researchers examined, but found no gender differences in expectancy-related beliefs among fourth graders in a running program (Xiang et al., 2004a, 2006). These contradictory findings have been explained to result from the perceived gender appropriateness of the activities or tasks, also referred to as *gender-stereotyped views* (Clifton & Gill, 1994; Lee, Fredenburg, Belcher, & Cleveland, 1999; Lirgg, 1991; Solmon, Lee, Belcher, Harrison, & Wells, 2003). That is, when individuals participate in activities deemed to be gender appropriate, their expectancy-related beliefs tend to

increase as a result. For instance, Xiang et al. (2004a, 2006) concluded that boys and girls did not differ in their expectancy-related beliefs in running probably because they viewed running as appropriate for both genders. However, Fredricks and Eccles (2002) and Jacobs et al., (2002) found no gender differences in the development of expectancy-related beliefs toward school sports.

Gender differences have also been observed in subjective task values. Several researchers who have examined gender differences have found that boys place higher importance on participating in sport (Eccles & Harold, 1991; Eccles et al., 1993; Fredricks & Eccles, 2002; Jacobs et al., 2002; Lee et al., 1999; Wigfield & Eccles, 1992). Contrary to previous research, in their study of high school varsity basketball players Cox and Whaley (2004) reported that male and female athletes equally considered playing basketball important, useful, and interesting. Similarly, Xiang et al. (Xiang et al., 2003; Xiang et al., 2004a, 2006) found that fourth grade boys and girls did not differ significantly in their subjective task values toward physical education as a subject area and running as a specific activity. Similarly, Gao et al. (2009) did not find any gender differences in 11- to 15-year-old school students' task values toward school physical education. Again, these conflicting results have explained the lack of gender differences in light of gender-stereotyped views. In other words, male and female students tend to value activities that they perceive as gender appropriate (Lauriola, Zelli, Calcatera, Cherubini, & Spinelle, 2004; Lee et al., 1999; Lirgg, 1991). When examining gender differences in the trajectories of task values toward school sports, Jacobs et al. (2002) found gender differences to increase across the elementary school years because girls' values for sports fell more rapidly than boys' values. After Grade 6 the gap gradually narrowed, the girls' values reaching a plateau while the boys' values continued to fall at an accelerating rate. By Grade 12, the gender difference was negligible. Finally, Fredricks and Eccles (2002) found the gender trajectories of interest (intrinsic values) and importance (attainment values) to be similar across elementary and middle school. In sum, the aforementioned empirical evidence has supported the utility of the expectancy-value theory (Eccles et al., 1983) in understanding school physical education motivation.

2.3.4 The self-determination theory

The self-determination theory defines intrinsic and varied extrinsic sources of motivation in cognitive and social development, and thus offers a broad framework for the study of human motivation (Deci & Ryan, 1985). The self-determination theory suggests that three psychological needs are essential for the growth and well-being of individuals (Deci & Ryan, 2000). Self-determination theorists posit that opportunities to experience autonomy, competence, and relatedness (each representing a basic psychological need) are critical in promoting multiple positive benefits and behavioral changes (see review by Hagger & Chatzisarantis, 2007). In addition, motivation, as a mental process, can be characterized by different levels of autonomy, ranging on a continuum from amotivation, through extrinsic motivation to intrinsic motivation (Deci &

Ryan, 1985; 2000). In the physical education context, Vallerand (1997) has highlighted the level of self-determination as mediating the relationship between needs and cognitive, affective, and behavioral outcomes. In addition, the self-determination theory emphasizes the internalization of social values (turning external goals into internal goals), the importance of optimal challenges to fulfill the need of competence, and the need of the possibility for choice-making to satisfy the need for autonomy (Deci & Ryan, 1983, 1991, 2002; Ryan, Connell, & Deci, 1985).

Deci and Ryan (2000) have explained the internalization process by different levels of motivational regulation ranging on a continuum from amotivation, through extrinsic motivation to intrinsic motivation. The autonomous end of the continuum is represented by intrinsic motivation, the state that refers to fully regulated behaviors that are performed for the activity's sake (e.g., for personal interest and pleasure) with no external contingency. The central area of the continuum constitutes various forms of extrinsic motivation that vary in their degree of relative autonomy (Deci & Ryan, 2008). Ranging from high to low autonomy, these regulations include integrated regulation, identified regulation, introjected regulation, and external regulation. Integrated regulation refers to activities performed without choice. For example, some students may want to participate actively in physical education not because they like it, but because it is perceived as an important part of a healthy lifestyle. These integrated regulations, however, are not normally expressed by children and adolescents, as younger populations may not yet have experienced a sense of integration. This dimension of extrinsic motivation is not usually assessed in children (Vallerand & Rousseau, 2001) and, therefore, was omitted from present study. Identified regulation occurs when an individual freely chooses to carry out an activity that is not considered to be enjoyable, but is perceived as important. Introjected regulation refers to the incomplete internalization of a regulation that was previously solely external (e.g., the behavior is performed to avoid feelings of guilt or for ego-enhancement) (Ryan & Deci, 2007). External regulation occurs when an individual engages in behaviors in order to receive a reward or to avoid punishment. The self-determination theory also identifies the state of amotivation, which refers to a lack of intention or the absence of motivation. Therefore, the involvement is likely to be disorganized and accompanied by frustration, fear or depressed feelings. Amotivation reflects a lack of motivation where no contingency between actions and outcomes is perceived, and there is no perceived purpose in engaging in the activity (Deci & Ryan, 1985) (Figure 2).

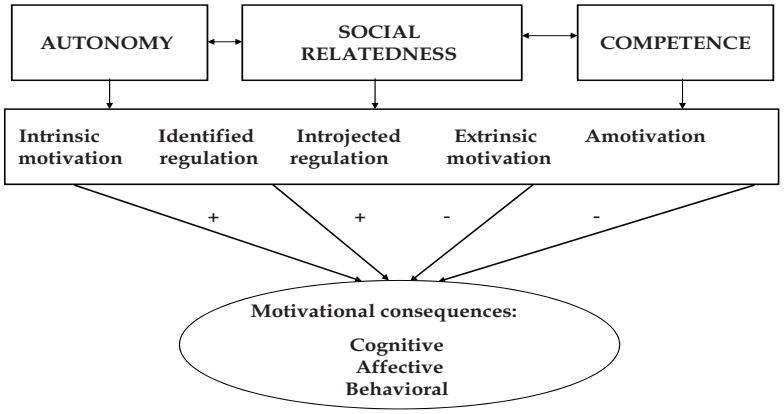


FIGURE 2 Theoretical framework of the self-determination theory (Deci & Ryan, 1985)

2.3.5 Motivational regulations and physical activity

Evidence supporting intrinsic motivation in physical education has shown that autonomous motivation (intrinsic motivation and identified regulation) correlates positively with many desirable outcomes of engagement in physical activity, such as high effort (Goudas, Biddle, Fox, & Underwood, 1995; Ntoumanis, 2001), preference for attempting challenging tasks (Standage, Duda, & Ntoumanis, 2005), and intention to be physically active in leisure-time (Hagger et al., 2003; Ntoumanis, 2001; Standage, Duda, & Ntoumanis, 2003). In addition, students' autonomous motivation in physical education has been positively associated with physical activity levels (Lonsdale, Sabiston, Raedeke, Ha, & Sum, 2009), physical activity during leisure-time (Chatzisarantis & Hagger, 2009; Hagger, Chatzisarantis, Barkoukis, Wang, & Baranowski, 2005), and the decision to enroll in physical education as an optional subject (Ntoumanis, 2005). In contrast, non-autonomous forms of motivation in physical education have been shown to be related to negative outcomes, such as boredom and unhappiness (Ntoumanis, 2002; Standage et al., 2005). In addition, a negative link has emerged between amotivation toward physical education and students' intentions to be physically active during their leisure-time (Standage et al., 2003). In sum, research guided by the self-determination theory has shown that autonomous motivation strongly influences adolescents' attitudes toward physical activity and other desirable motivational indices. In contrast, non-autonomous motivation has been shown to correlate negatively with positive outcomes and to undermine students' autonomous responses. The research to date lends support to the self-determination theory by demonstrating that students benefit from being autonomously motivated in physical education (e.g., Ryan & Deci, 2007).

2.3.6 Development of motivational regulations

Developmental research examining the growth of student motivation in physical education has been scarce, with findings generally based on the use of cross-sectional data. The existing research mirrors previous findings indicating age-related declines in indices of autonomous motivation in physical education. For example, Digelidis and Papaioannou (1999) found in a cross-sectional study of 674 Greek 10- to 17-year-old students that senior high school students reported lower intrinsic motivation and perceived athletic ability than middle school and elementary school students. Furthermore, longitudinal studies have shown decreases in autonomous physical education motivation (Ntoumanis, Barkoukis, & Thøgersen-Ntoumani, 2009) as well as academic motivation (e.g., Gottfried, Flemming, & Gottfried, 2001; Lepper, Corpus, & Iyengar, 2005) across the elementary into middle school years. For example, in a six-year longitudinal study on 9- to 10-year-old children in the US, Lepper et al. (2005) found that intrinsic motivation in the classroom declined across the grade levels, whereas extrinsic motivation remained unchanged. The authors speculated that decreases in intrinsic motivation might be partly the result of a greater emphasis on ego-involving criteria for success and competence. However, recent studies on the longitudinal growth of motivational regulations in physical education have reported conflicting results (Ntoumanis et al., 2009; Taylor, Ntoumanis, Standage, & Spray, 2010). Following 453 13- to 15-year old Greek students across three years, Ntoumanis et al. (2009) found levels of intrinsic motivation and identified regulation to decrease with time. In contrast, amotivation increased while other forms of regulation remained stable across the measurements. Taylor et al. (2010) followed 178 11- to 16-year-old English students from four different grade levels across one school year. The study showed mean levels of motivational regulations to increase during the school year. However, this study found only identified regulation and intrinsic motivation to predict leisure-time physical activity.

Although findings have shown boys' beliefs and values toward physical education to be higher than girls', it is surprising that very few studies have examined gender differences in the development of physical education motivation. Ntoumanis et al. (2009) examined the development of physical education motivation across Greek middle school. They found no gender differences in the growth trajectories in respect of the motivational regulations toward physical education. In addition, testing the relationships between autonomous motivation and leisure-time physical activity showed similar effects between boys and girls (Taylor et al., 2010). Studies examining similar constructs have shown high levels of interest among girls until 14 years of age, declining thereafter until the age of 18 (van Wersch, Trew, & Turner, 1992). Moreover, studies in educational settings (Vallerand & Bissonnette, 1992) and sport (Fortier, Vallerand, Briere & Provencher, 1995) have shown that girls perceived higher levels of autonomous motivation compared to boys.

2.4 Summary of the literature and rationale of the study

The aims of the present dissertation evolved from the findings of previous studies and the need for further studies. Previous studies have reported evidence of a decline in adolescents' physical activity through childhood into adolescence (Caspersen et al., 2000; Currie et al., 2008; Duncan et al., 2007; van Mechelen et al., Sallis et al., 2000; Telama & Yang, 2000; Telama et al., 1997; Telama et al., 2005). A similar trend has been evident in students' motivation toward physical education (Eccles & Migley, 1989; Eccles et al., 1989; Eccles et al., 1998; Jacobs et al., 2002; Wigfield et al., 1991; Wigfield et al., 1996; Wigfield et al., 1997). In addition, scholars have advocated intra-individual motivation toward physical education to be a powerful determinant of adolescents' physical activity (see review by Biddle, Wang, Chatzisarantis, & Spray, 2003; Duda & Ntoumanis, 2003; Standage et al., 2007). However, the following three limitations have been apparent in studies of the temporal growth of physical activity and motivation toward physical education. First, few studies have examined adolescent physical activity and motivation toward physical education across the middle school transition ages of 12-15 by means of appropriate statistical techniques for longitudinal data, such as cross-lagged longitudinal or latent growth curve modeling (LGCM) (Barkoukis, Ntoumanis, & Thøgersen-Ntoumani, 2010; Duncan et al., 2007; Fredricks & Eccles, 2002; Jacobs et al., 2002; Nader et al., 2008; Ntoumanis et al., 2009). Examination of cross-lagged relations longitudinally enables the possibility to test the causalities of two or more variables while controlling for previous levels. In addition, the LGCM technique is able to capture important group statistics in a way that allows development to be studied at the group level while also capturing individual differences in the levels and trajectories of physical activity over time (Aunola et al., 2002; Duncan, Duncan, Strycker, Li, & Alpert, 1999). Second, previous results examining age-related decline in physical activity and motivation toward physical education between the genders have been controversial (Caspersen et al., 2000; Eccles & Harold, 1991; Eccles et al., 1993; Gao & Xiang, 2008; Jacobs et al., 2002; van Mechelen et al., 2000; Sallis et al., 1992; Telama & Yang, 2000; Wigfield et al., 1997; Xiang et al., 2004a, 2006; Xiang et al., 2004b; Xiang et al., 2003). Extending the previous research findings by examining differences in individual growth curves, instead of mean level differences across different time points, enables statistical testing of gender-specific growth trajectories (Duncan et al., 2007). In addition, previous studies examining students' motivation in physical education has conceptualized school physical education as school sports. This is possibly an important distinction when examining gender differences because boys' have been found to be more active and have more positive attitudes across school sports (Child Trends, 2010). Finally, the most important contribution of the present study is that it followed up the longitudinal development of physical activity and physical education motivation during the middle school transition across Grades 6 to 9. This study is one of the few longitudinal studies in the field to draw on the

theoretical assumptions of both the expectancy-value theory and self-determination theory in the same study. In addition, this study is one of the first to determine the temporal linkage of school physical education and physical activity.

2.5 Theoretical framework of the study

To examine the development of students' physical activity, this study operationalized physical activity by following the World Health Organization HBSC research protocol (World Health Organization, 1996). In this study, the measurement of students' physical activity comprised moderate to vigorous physical activity frequency in all the various physical activity contexts of an adolescent's life, and thus included all aspects of physical activity settings (i.e. school, sports club, leisure-time). To examine the development of students' physical education motivation, we conceptualized physical education motivation by drawing on two prominent motivation theories. Because of its proven ability to assess students' motivation in the school environment, the modern expectancy-value theory (Eccles et al., 1983) was used to study students' physical education motivation. Additionally, the self-determination theory (Deci & Ryan, 1985) was used to assess students' motivational regulation, that is, intrinsic motivation, identified regulation, introjected regulation, extrinsic motivation, and amotivation in physical education. The self-determination theory has been found to be an advantageous framework in which to examine the transfer of adaptive physical education motivation to subsequent physical activity behavior (Cox et al., 2007; Hagger et al., 2003; Shen et al., 2008). In sum, these two theories constitute the theoretical framework of the present study by providing meaningful operationalization of physical education motivation in the school-based physical education context (Figure 3).

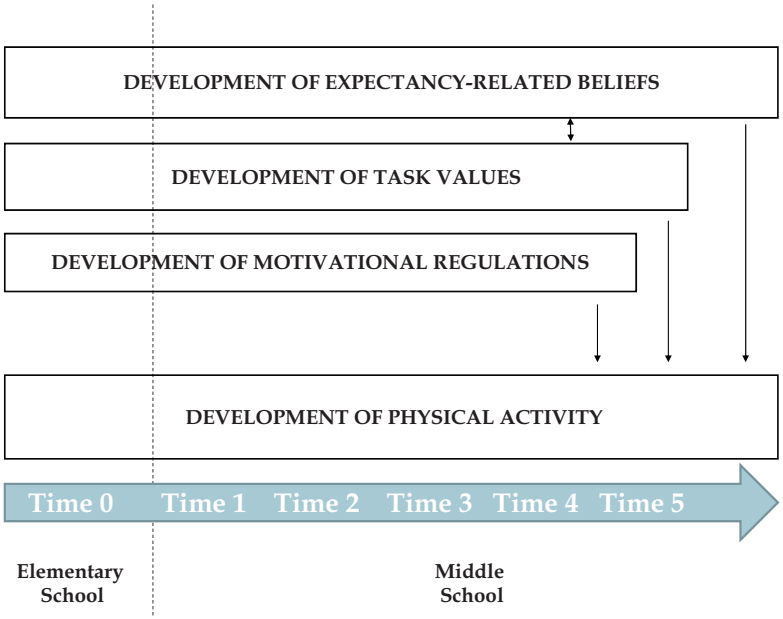


FIGURE 3 Theoretical framework of the study

3 PURPOSE OF THE STUDY

In general, the aim of this study was to examine the development of students' physical activity and physical education motivation and the longitudinal relationships between the development of students' expectancy-related beliefs, task values, motivational regulations, and physical activity across Grades 6 to 9. Specifically, the research questions of the present study were:

1) To examine developmental growth and gender differences in students' physical activity across Grades 7 to 9. (Study IV)

2) To examine developmental growth and gender differences in students' expectancy-related beliefs and task values toward physical education across Grades 6 to 9. (Study V)

Additional aims were:

2a) To determine the extent to which the members of physical education peer groups resemble each other in task values toward physical education at Grade 6. (Study II)

2b) To examine whether different student subgroups can be identified on the basis of the development of their expectancy-related beliefs and task values toward physical education across Grades 6 to 9. (Study V)

3) To examine developmental growth and gender differences in students' motivational regulations in physical education across Grades 6 to 9.

An additional aim was:

3a) To examine whether different student subgroups can be identified on the basis of their motivational regulations in Grade 6. (Study I)

4) To examine the relationships between the development of students' expectancy-related beliefs and task values toward physical education and the development of their physical activity across Grade 6 to 9. (Studies I, II, III, IV, and V)

Specific aims were:

4a) To test the longitudinal relationships between students' task values toward physical education motivation and their physical activity across Grades 7 to 9. (Study III)

4b) To examine whether student subgroups based on the development of students' expectancy-related beliefs and task values toward physical education differ in their development of physical activity across Grades 6 to 9. (Study V)

4 METHOD

4.1 Sample and participants

The data of the present dissertation study followed a community sample (N = 812, 382 girls, 430 boys) of Finnish adolescents across Grades 6 to 9. The students were 11- 13 years old (M = 12.31, SD = .22) at the beginning of the study and they were followed for three and a half years. A total of 17 elementary schools and eight middle schools were included in the study. The research protocol was approved by the Ethical Committee of the University of Jyväskylä. Parental consents for each student were obtained. The participants were told that their involvement in the study was voluntary, with scores kept confidential. In addition, if for any reason they were unable to finish the inventory, they were informed that they could take a short break and continue when they felt ready or, if necessary, they could cease completion of the measures at that point. The participants were also told to ask for help if they felt confused concerning either the instructions or the clarity of a particular item. This additional help was provided by the researcher and not by the student's own teacher in order to avoid biased answers. Students who were absent from school on the day of the measurements were tested as soon as they were back at school again. Figure 4 shows the sample size at each measurement wave.

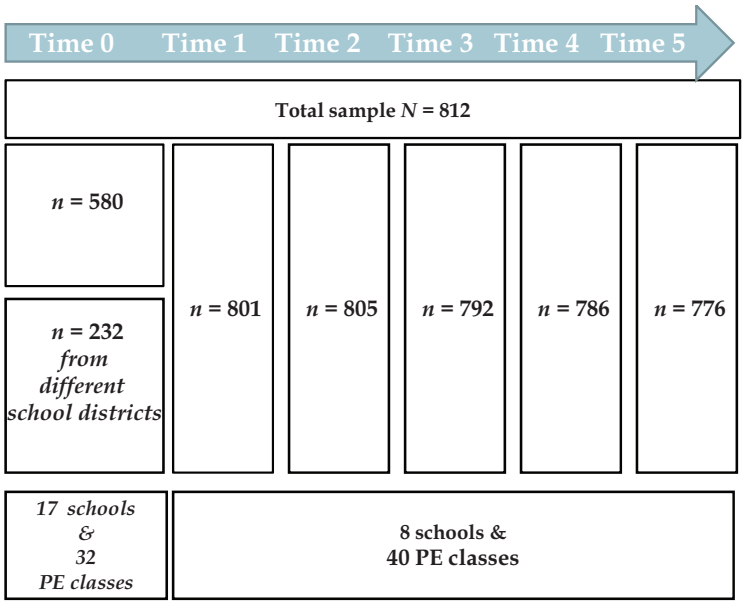


FIGURE 4 The sample of the study

Study I

In Study I the first data wave of the first measurement of the study was analyzed. Only those students who returned their parental consents in time were included in Study I (theoretical N = 580). Consequently, the participants of the first study comprised a sample of 429 Finnish Grade 6 students consisting of 216 girls and 213 boys, aged between 11 and 14 years (M = 12.04, SD = .23). A total of 17 elementary schools (32 physical education classes) were included in the study.

Study II

In Study II the data from the first and second measurements (T0 and T1) of the study were analyzed. A total of 330 (173 girls, 157 boys, M = 12.17, SD = .22, age range = 11 to 13) students who answered all the questionnaires at T0 and T1 and were members of gender homogenous peer groups at Grade 6 were included in the study (theoretical N = 580).

Studies III and V

In Studies III and V the data at the measurement points T0, T1, T3, and T5 were examined. A total sample of 812 (382 girls, 430 boys) 12- to 13-year-old (M = 12.31, SD = .22) students from eight middle schools was examined with respect to their transition across Grades 6 to 9.

Study IV
In Study IV a total sample of 812 (382 girls, 430 boys) students from eight middle schools (40 PE classes) were examined during their transition from Grade 7 to Grade 9 (T1 to T5). The students were followed for three years and their ages were 12–13 years (M = 12.31, SD = .22) at the beginning of the study (T0).

4.2 Measures

4.2.1 Physical Activity Scale

To assess students' self-reported physical activity, the HBSC research protocol was used (World Health Organization, 1996). The stem preceding the items was: "In the next two questions physical activity means all activities which raise your heart rate or momentarily get you out of breath, for example, in doing exercise, playing with your friends, going to school, or in school physical education. Sport also includes, for example, jogging, intensive walking, roller skating, cycling, dancing, skating, skiing, soccer, basketball, and baseball." The two items, presented in the form of statements, required students to summarize the amount of time they spent in physical activity each day: (a) "When you think about your typical week, on how many days are you physically active for a total of at least 60 minutes per day?" and (b) "Over the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?" Both items used an eight-point response scale (0–7 days of the week). Previous research has shown the Physical Activity Scale to have acceptable reliability and validity among 11- to 15-year-old children and adolescents (Booth et al., 2001; Prochaska, Sallis, & Long, 2001). In addition, the Finnish version of the scale has been demonstrated to have acceptable reliability and validity among Finnish children and adolescents (Vuori et al., 2005). The Pearson's correlation coefficients (range: girls 89 to .91, boys .89 to .92) of this scale indicated high internal consistency of the present data (Table 1).

4.2.2 Self-Perception Questionnaire and Task Values Scale

The students were asked to rate their expectancy-related beliefs in physical education using the Finnish version of the Self Perception Questionnaire (Eccles, Addler, & Meece, 1984). This scale is a five-point scale and it is based on the conceptualizations of Eccles et al. (1983) with modifications appropriate to the physical education context. Students were asked three questions (items 8, 9, and 10 from the original Self-Perception Questionnaire): (a) How good are you in physical education? (*1 = very bad… 5 = very good*); (b) Compared to other students, how good in physical education are you? (*1 = one of the worst… 5 = one of the best*); and (c) How good would you be at learning something new in physical education this year? (*1 = very bad… 5 = very good*). The average score of the three items was used as a measure of students' expectancy-related beliefs.

Task values toward physical education were measured using the Finnish version of the Task Value Scale (Niemivirta, 2002; Viljaranta, Nurmi, Aunola, & Salmela-Aro, 2009), which is based on the conceptualizations of the Task-Perception Scale developed by Eccles et al. (1983). Students were asked to answer the following two sets of questions. First: "How *important* do you find school physical education?" (attainment value), "How *useful* do you find school physical education?" (utility value), and "How *interesting* do you find school physical education?" (intrinsic or interest value). Second: "How *important* do you find school physical education for your future?" (attainment value), "How *useful* do you find school physical education for your future?" (utility value), and "How *interesting* do you find school physical education for your future?" (intrinsic or interest value). The students were asked to respond on a five-point Likert scale (*1 = not so important/useful/interesting… 5 = very important/useful/interesting*). In Study II the mean of the two items was used to assess students' attainment, utility, and intrinsic values toward physical education. Furthermore, in Studies III, IV, and V the mean of all six items measuring the three dimensions of task values toward physical education was calculated and used as the students' physical education task value score. Eccles and Wigfield (1995) have demonstrated high reliability and validity of the scale in a series of studies of elementary and middle school students. In the present data, Cronbach's alpha coefficients of the Self-Perception Questionnaire (range: girls .89 to .92, boys .90 to .92) and of the Task Value Scale (range: girls .88 to .91, boys .89 to .91) indicated high internal consistency (Table 3).

4.2.3 Physical Education Motivation Scale

Contextual intrinsic and extrinsic motivation together with amotivation was measured by the Finnish version of the Physical Education Motivation Scale (Jaakkola, 2002) which is a modified version of the Sport Motivation Scale (Pelletier et al., 1995). The Physical Education Motivation Scale consists of seven subscales comprising three types of intrinsic motivation (intrinsic motivation to accomplish, intrinsic motivation to know, and intrinsic motivation to experience stimulation), three forms of extrinsic motivation (identified, introjected, and external regulation), and amotivation. Each dimension consisted of four items. Each item was rated on a five-point Likert scale (1 = *does not correspond at all…* 5 = *corresponds exactly*). The scale used in this study had the individual item stem, "I'm currently participating in physical education". The research literature has indicated support for the construct validity and internal consistency of the Sport Motivation Scale in different cultures in sport (Pelletier et al., 1995) and in Finnish physical education (Jaakkola, 2002). In the present study, the high Cronbach's alpha coefficients of the different regulatory dimensions (range: girls .70 to .95, boys .70 to .95) indicated acceptable internal consistency of the scale in the data (Table 8).

4.3 Statistical methods

Various statistical methods were used in this study. This section presents in detail the broader concept of the developmental perspective in adolescents' growth. In addition, to fully utilizing the developmental approach, LGCM and the growth mixture modeling (GMM) approach were implemented and are explained in detail below. The five original papers should be consulted for more detailed information concerning the other methods used.

4.3.1 Developmental perspective

Students' development across elementary and middle school is highly individual. Multiple changes, such as biological, psychological, and contextual changes, are among the most dramatic that individuals experience during their lifetime (Wigfield, Byrnes, & Eccles, 2006). Some of these changes occur in children and adolescents at different times of their lives. Traditional statistical analyses, such as group means and standard deviations, do not describe any specific individual in detail, and therefore generalizations drawn from data do not necessarily illuminate individual development (Gottlieb, 2003). Instead, it is important to acknowledge the various growth trajectories of different students. Furthermore, individual development consists of various kinds of cumulative or self-perpetuating cycles in which the previous levels of system functioning have consequences for the subsequent developmental trend (see Aunola et al., 2002). In most of the studies on students' development, growth has been viewed as mean level temporal change over time (e.g., Telama & Yang, 2000; Telama et al., 2005; Wigfield et al., 1997). However, this approach does not consider the possible impact in this process of the previous level of functioning. LGCM is an effective tool for analyzing development because it places individual growth trajectories at the center of focus (Curran & Muthen, 1999; Li, Duncan, & Acock, 2000). The advantages of the structural equation modeling approach are its possibilities for flexible, theory-based model building with several latent constructs (taking into account measurement error), examination of direct and indirect effects, and estimation of all associations between factors in the model simultaneously. In addition, LGCM enables important group statistics to be captured in a way that allows the researcher to study development at the group level while also capturing individual differences in levels and trajectories over time. Questions and hypotheses concerning the determinants of initial status and growth can be addressed by examining the covariates of the intercept and slope scores (Duncan et al., 2007). Only if the trajectory is clearly defined does it become possible to quantitatively summarize evidence across trajectories. The task of comparing people then becomes the task of comparing the parameters of these personal trajectories. A model is thus needed for the population distribution of the parameters of personal growth (Raudenbush, 2001).

4.3.2 Latent growth curve modeling

In Studies IV and V, the LGCM approach was applied (Duncan et al., 1999; Muthén & Khoo, 1998). This enables simultaneous investigation of the *initial level* (*Level,* intercept) and *growth trajectory* (*Slope*, change) of the variables of interest and the association between the initial level and growth across time. The LGCM technique does not allow missing values (missing values: 29% at T0, 1% at T1, 1% at T2, 2% at T3, 3% at T4, 6% at T5) in dependent variables, therefore, an EM algorithm to impute missing values was conducted (Schafer, 1997). The missing values analyses showed no statistically significant ($p < .001$) differences between the imputed and observed values of the research variables. First, linear models with two latent components, the Level and the Slope component, were estimated. The models were constructed by fixing the loadings of the observed variables across e.g. Time 0 to Time 4 to 1 on the initial level and to 0, 1, 2, 3, and 4 on growth. The variances and covariance of the latent components and the residual variances of the observed variables were estimated. Occasionally, the growth of variables across time was not linear, the non-linear protocol of Bollen and Curran (2006) was implemented. Non-linear models were constructed by fixing only the first two loadings of the growth component and allowing the last two parameters to be freely estimated. Thus, the mean of the latent growth factor represents the mean of growth of the observed variables. More detailed information on growth can be obtained by examining the estimations of the later time points. Figure 5 presents an example of a latent growth curve for five time points: y_1-y_5 = observed variables, ε_1-ε_5 = residuals of the observed variables, f_1 and f_2 = latent components, ψ_{11} and ψ_{22} variances and ψ_{21} covariance of f_1 and f_2, α_1 and α_2 = means of f_1 and f_2.

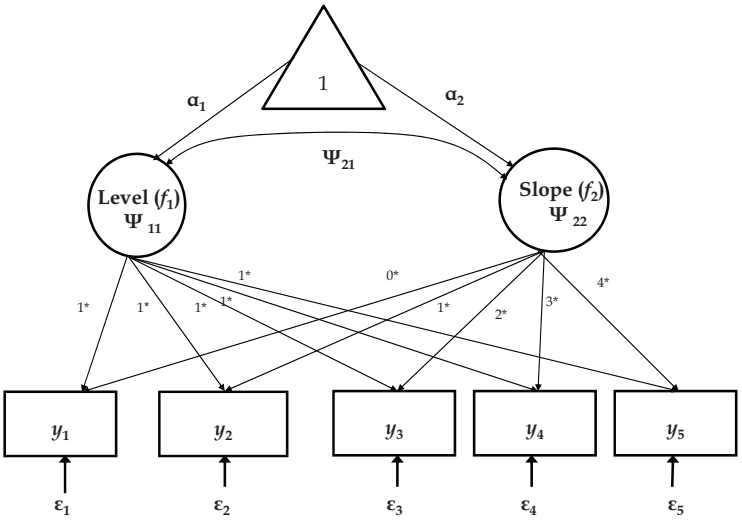


FIGURE 5 A linear latent growth curve model for five time points

To test for similarity of the growth trajectories between the genders, the two-group protocol by Muthén and Asparouhov (2002) was implemented. In two-group testing, two hypothesized nested models (H_0 and H_1) can be tested by constraining the subsequent parameters to be equal. If the p value associated with the $\chi 2$ test is non-significant, H_0 can be rejected and alternative hypothesis H_1 can be accepted.

All the analyses were performed within a structural equation modeling framework using the Mplus statistical package (Versions 5.1 and 6.0; Muthén & Muthén, 1998–2010). Unequal probability of selection is an inevitable feature of complex sampling surveys (Asparouhov, 2005). This can be the result of, e.g., stratified sampling, cluster sampling, or subpopulation oversampling. In the physical education context, the students are members of their physical education class. It is possible that this membership could create selection bias, which may affect the parameter estimates. Therefore, physical education classroom membership was incorporated in the analyses by applying the Mplus COMPLEX option (Asparouhov, 2005; 2006). A model fits the data well when the p value associated with the $\chi 2$ test is non-significant. Bentler's comparative fit index (*CFI*) and Tucker-Lewis index (*TLI*) values above .95 and Root Mean Squared Error of Approximation (*RMSEA*) values below .06 indicate a good fit between the hypothesized model and the observed data (Hu & Bentler, 1999). However, larger sample models tend to be rejected as inadequate, while subsequent small sample models, if evaluated, might be equally acceptable. Therefore, in appendix A, a general null model (Normed Fit Index, *NFI*) based on modified independence among variables is presented to provide an additional reference point for the statistical and scientific evaluation of covariance structure models (Bentler & Bonetti, 1980). *NFI* values above .95 indicate a good fit between the hypothesized model and the observed data.

4.3.3 Growth mixture modeling

Study V examined whether different latent student subgroups (subpopulations) can be detected based on the growth components of expectancy-related beliefs and task values. In addition, the study examined if these student subgroups differ in the development of physical activity. To do this we applied the GMM approach (Muthén, Khoo, Francis, & Boscardin, 2002; Muthén & Muthén, 2000). First, suitable latent growth curve models of students' expectancy-related beliefs and task values towards physical education were specified. Second, latent trajectory classes were formed on the basis of the previously found growth factor means (i.e., means of initial level and slope) so that each class defines a different mean trajectory over time. Growth mixture models both estimate mean initial level and growth curves for each identified class and capture individual variation around these level and growth components (Muthén & Muthén, 2000). In the GMM, within-class variation of individuals is allowed for the latent trajectory classes. The within-class variation is represented by random effects, that is, continuous latent variables as in regular growth modeling. Model testing for each measure was started by letting the random effect means vary across the

classes (means of the initial level and growth components were allowed to change across classes). On the basis of the suggestions by Muthén and Muthén (2000) and Muthén et al. (2002), five different considerations were used to decide on the number of latent trajectory classes: (a) the Akaike's information criteria (*AIC*); (b) the Bayesian information criteria (*BIC*); (c) the adjusted Bayesian information criteria (*ABIC*) (the lower the *AIC*, *BIC*, and *ABIC* values, the better the model); (d) the Vuong-Lo-Mendell-Rubin test of fit, which compares solutions with different number of classes (p value < .05 indicates that the k - 1 class model has to be rejected in favor of a model with at least k classes); and (e) the usefulness of the latent classes in practice (e.g., the number of individuals in each class, the values of the estimated parameters). Third, the growth in physical activity behavior of each estimated class was assessed by implementing the LGCM technique. The latent growth curve models were conducted separately for each student subgroup. Different linear and non-linear models were conducted to identify the best models to represent the growth of the different student subgroups.

5 RESULTS

This chapter summarizes the main findings of the present study and introduces new unpublished findings. Original papers (I-V) and the appendix of the present study should be consulted for more detailed information.

5.1 Students' physical activity

The descriptive findings, such as correlation coefficients, means, and standard deviations of the physical activity variables, are presented in Table 1. The correlation matrix showed moderate to high positive correlations between the physical activity measurements (*r* range from .30 to 71). The closer the measurement time the stronger was the correlation. Inspection of the mean scores showed that boys' physical activity was higher than girls'. In addition, the mean levels of students' physical activity decreased across time for both genders (M_{girls} range from 3.49 to 4.86, M_{boys} range from 3.81 to 5.14).

TABLE 1 Summary of Intercorrelations, Means, and Standard Deviations for Physical Activity (PA) Variables at six measurement points (T0-T5).

Variables	1	2	3	4	5	6	*M*	*SD*	*r*
1 PA (T0)	-	.56**	.41**	.30**	.42**	.38**	4.86	.90	.90
2 PA (T1)	.58**	-	.58**	.49**	.47**	.44**	4.06	1.60	.91
3 PA (T2)	.41**	.61**	-	.61**	.55**	.53**	4.06	1.56	.90
4 PA (T3)	.42**	.54**	.67**	-	.59**	.59**	3.64	1.55	.89
5 PA (T4)	.42**	.49**	.57**	.66**	-	.65**	3.65	1.55	.90
6 PA (T5)	.37**	.47**	.50**	.61**	.71**	-	3.49	1.64	.92
M	5.14a	4.45a	4.50a	4.15a	4.11a	3.81a			
SD	.92	1.70	1.71	1.72	1.66	1.59			
r	.90	.89	.89	.90	.91	.91			

Note 1. Intercorrelations for girls (n = 382) are presented above the diagonal, and intercorrelations for boys (n = 430) are presented below the diagonal. Means and standard deviations for girls are presented in vertical columns and means and standard deviations for boys are presented in horizontal columns.
Note 2. Sample size at Time 0 (T0) was 580 (girls = 270, boys = 310).
Note 3. **p < .001; [a] = statistical difference between genders (independent t test, p < .05); r = Pearson's correlation coefficient of two physical activity measures.

5.1.1 Development of students' physical activity across Grades 6 to 9 (Study IV)

The first aim of the study was to examine the development of students' physical activity across Grades 7 to 9. The LGCM technique was implemented and fit of the models and estimated parameters are presented in Table 2. The results showed that students' physical activity decreased across all the measurements (girls f_2 = -.56, boys f_2 = -.66). Furthermore, examination of the mean level of physical activity indicated that the decrease in physical activity accelerated across the middle school transition (T0-T1). This study found boys (f_1 = 4.45) to be more active than girls (f_1 = 4.05) at Grade 7 (T1). Inspection of the variance of the Level construct showed that students were heterogeneous in their physical activity at Grade 7 (girls' ψ_{11} = 1.77, boys' ψ_{11} = 1.93). Additionally, inspection of the variance of the Slope component revealed that students' growth trajectories of physical activity were relatively similar across Grade 7 to 9 (girls' ψ_{22} = .07, boys' ψ_{22} = .09). Examination of covariance of the latent Level and Slope constructs (girls' ψ_{21} = -.45, boys' ψ_{21} = -.55) revealed that the growth trajectories grew increasingly similar across time. In other words, students became increasingly similar in their physical activity across time. Finally, two-group testing of similarity in the development of physical activity, that is, similarity in the mean levels of the growth trajectories, showed that although boys were physically more active than girls, there were no gender differences in the development of physical activity (detailed information on the testing of gender differences is given in Appendix A).

TABLE 2 Estimation Results for the Final Unconditional Latent Growth Models for Physical Activity.

Estimates of Parameters	Physical Activity	
	Girls	Boys
Means		
Level (f_1)	4.05 (1.58)	4.45 (1.68)
Slope (f_2)	-.56 (1.62)	-.66 (1.64)
Variances		
Level (ψ_{11})	1.74 (.19)	1.93 (.16)
Slope (ψ_{22})	.07 (.01)	.09 (.01)
Covariance (ψ_{21})	-.45 (.01)	-.55 (.05)
Error variances		
ε_1	1.21 (1.16)	1.01 (1.15)
ε_2	.95 (1.13)	1.21 (1.12)
ε_3	.99 (1.12)	1.31 (1.14)
ε_4	.91 (1.11)	.99 (1.13)
ε_5	.82 (1.16)	.48 (1.14)
Fit of the model	$\chi^2(7) = 5.591$ $p = .588$ *CFI* = 1.00 *TLI* = 1.00 *RMSEA* = .000 90%, CI [.00, .06]	$\chi^2(5) = 4.145$ $p = .529$ *CFI* = 1.00 *TLI* = 1.00 *RMSEA* = .000 90%, CI [.00, .06]

Note 1. The unstandardized solutions. Standard errors are in parentheses.
Note 2. Ns = possible non-significance of estimated components.

5.2 Students' expectancy-related beliefs and task values toward physical education

The descriptive findings, such as the correlation coefficients, means, and standard deviations of the expectancy-related belief and task value variables are presented in Table 3. The correlation matrix showed high positive correlations for both the expectancy-related beliefs and task values variables, the correlation weakening across time (beliefs *r* range from .48 to 75, task value *r* range from .48 to 73). Furthermore, the dimensions of expectancy-related beliefs and task values were moderately correlated, as theorized by Eccles et al. (1983) (*r* range from .28 to 51). The mean levels of expectancy-related beliefs declined across the middle school transition, but no growth was observed across middle school. In contrast, the mean levels of the students' task values were rather stable, with a temporary increase at Grade 7. Inspection of the mean scores showed that boys' beliefs and values were higher than those of girls at all the measurement points except the first. Based on independent *t* test, students had similar physical education task values at Grade 6.

TABLE 3 Summary of Intercorrelations, Means, and Standard Deviations, and Cronbach's Alphas for Expectancy-Related Belief and Task Value Variables.

Variables	1	2	3	4	5	6	7	8	*M*	*SD*	*a*
1 Beliefs (T0)	-	.76**	.69**	.63**	.51**	.44**	.33**	.31**	3.34	.69	.89
2 Beliefs (T1)	.75**	-	.65**	.61**	.42**	.48**	.31**	.28**	3.05	.72	.90
3 Beliefs (T3)	.63**	.58**	-	.73**	.41**	.41**	.46**	.40**	3.04	.72	.91
4 Beliefs (T5)	.62**	.59**	.68**	-	.34**	.35**	.38**	.38**	3.08	.75	.92
5 Values (T0)	.36**	.40**	.32**	.37**	-	.73**	.56**	.49**	4.01	.71	.91
6 Values (T1)	.34**	.45**	.33**	.38**	.73**	-	.56**	.48**	4.09	.91	.91
7 Values (T3)	.37**	.40**	.44**	.44**	.48**	.49**	-	.71**	3.85	.96	.88
8 Values (T5)	.35**	.36**	.28**	.47**	.56**	.52**	.64**	-	3.93	.89	.88
M	3.52[a]	3.24[a]	3.27[a]	3.28[a]	4.07	4.23[a]	4.12[a]	4.13[a]			
SD	.74	.75	.72	.70	.67	.84	.87	.83			
a	.90	.90	.92	.92	.89	.89	.90	.91			

Note 1. Intercorrelations for girls (n = 382) are presented above the diagonal, and intercorrelations for boys (n = 430) are presented below the diagonal. Means, standard deviations, and Cronbach's alphas for girls are presented in vertical columns and means, deviations, and Cronbach's alphas for boys are presented in horizontal columns.
Note 2. Sample size at Time 0 (T0) was 580 (girls = 270, boys = 310).
Note 3. **p < .001; [a] = statistical difference (independent t test, p < .05); a = Cronbach's alpha coefficient.

5.2.1 Development of expectancy-related beliefs and task values (Studies II, III, and V)

The second aim of the study was to examine the development of students' expectancy-related beliefs and task values toward physical education across Grades 6 to 9. The LGCM technique was implemented and the fit of the models and estimated parameters are presented in Table 4. The results of the LGCM showed a non-linear decrease in the students' expectancy-related beliefs toward physical education across the measurements (f_2 = -.29). The greatest decline in students' expectancy related beliefs occurred during the middle school transition (T0-T1). However, examination of the estimated values of the components during middle school (T3 and T5) indicated that no changes in students' expectancy-related beliefs toward physical education occurred during middle school (T1-T5). Boys' mean levels of beliefs were higher than those of girls (M_{girls} = range 3.04 to 3.34, M_{boys} = range 3.24 to 3.52). In addition, inspection of the variance of the Level construct showed that students were heterogeneous in their expectancy-related beliefs toward physical education at Grade 6 (ψ_{11} = .51). Additionally, inspection of the variance of the Slope construct revealed that students' were relatively similar in their growth trajectories of expectancy-related beliefs across Grade 6 to 9 (ψ_{22} = .20). Examination of the covariance of the latent Level and Slope constructs (ψ_{21} = -.19) revealed that students' growth trajectories became increasingly similar across time. Finally, two-group testing of similarity in the development of expectancy-related beliefs, that is, similarity in the means of Level and Slope, showed that he development of students' expectancy-related beliefs was similar between the genders, despite the fact that boys had higher initial levels of beliefs than girls (detailed information on the testing of gender differences is given in Appendix A).

The results of the LGCM showed a non-linear increasing trajectory of the students' task values towards physical education across Grades 6 to 9 (f_2 = .13) (Table 4). Closer inspection of the estimated values of the various components during middle school (T3 and T5) revealed that the development of students' task values toward physical education was rather stable across time, the increase occurring during the middle school transition (T0-T1) and thus temporary only. In fact, the development of students' task values across middle school (T1-T5) decreased, the mean levels returning to the levels of Grade 6 during middle school. This study found boys' levels of values to be higher (except at T0) than those of girls (M_{girls} = range 3.85 to 4.09, M_{boys} = range 4.07 to 4.23). Inspection of the variance of the Level construct showed that students were relatively heterogeneous in their task values toward physical education in Grade 6 (ψ_{11} = .33). Additionally, inspection of the variance of the Slope construct revealed that students were relatively similar in their growth trajectories of task values across Grades 6 to 9 (ψ_{22} = .21). Examination of covariance of the latent Level and Slope constructs (ψ_{21} = .11) revealed that students grew increasingly different across time. Finally, the two-group testing of similarity in the development of task values, that is, similarity in the means of Level and Slope, showed that while there were no gender differences in the initial levels of task values, there were gender differences in the development of students' task values toward physical education (see Appendix A for detailed information).

TABLE 4 Estimation Results for the Final Unconditional Latent Growth Models for Expectancy-Related Beliefs and Task Values.

Estimates of Parameters	Expectancy-related beliefs	Task Values
Means		
Level (f_1)	3.44 (.03)	4.05 (.03)
Slope (f_2)	-.29 (.02)	.13 (.02)
Variances		
Level (ψ_{11})	.51 (.03)	.33 (.03)
Slope (ψ_{22})	.20 (.04)	.21 (.02)
Covariance (ψ_{21})	-.19 (.03)	.11 (.02)
Estimates values		
T3	.91(.08)	-.09(.09)
T5	.93(.08)	-.18(.08)
Error variances		
ε_1	2.95 (1.16)	.14 (.02)
ε_2	.95 (1.13)	*0
ε_3	.99 (1.12)	.52 (.05)
ε_5	.91 (1.11)	.44 (.03)
Fit of the model	$\chi^2(2) = 2.954$ $p = .228$ *CFI* = 1.00 *TLI* = 1.00 *RMSEA* = .025 90%, CI [.00, .08]	$\chi^2(2) = 1.477$ $p = .678$ *CFI* = 1.00 *TLI* = 1.00 *RMSEA* < .001 90%, CI [.00, .05]

Note 1. The unstandardized solutions. Standard errors are in parentheses.
Note 2. Ns = possible non-significance of estimated components.

5.2.2 Role of peer groups in students' task values at Grade 6 (Study II)

An additional aim (2a) was to examine the similarities between the members of student peer groups in their task values toward physical education at Grade 6. The results showed that students' peer groups were homogeneous in their task values toward physical education. The members of girls' peer groups resembled each other moderately in all the task value variables toward physical education (i.e., attainment values, utility values, intrinsic values), whereas the members of boys' peer groups showed moderate homogeneity only in intrinsic values and no homogeneity in utility or attainment values (Table 5).

TABLE 5 Summary of Intercorrelations, Means, and Standard Deviations for Task Value Variables for Within and Between Levels.

Variables	1	2	3
1 Attainment Value	-	.99** .97	.73** .81
2 Utility Value	.79** .83**	-	.71** .73
3 Intrinsic Value	.57** .58**	.47** .54**	-
M	3.98 4.03	4.11 4.14	3.85 4.06
SD	1.04 .97	1.00 .93	1.12 .98

Note 1. For each pair of variables, the upper number in the row represents the girls' values and the below number represents the boys' values.
Note 2. Between-level intercorrelations (girls n = 44, boys n = 39) are presented above the diagonal, and within-level intercorrelations (girls n = 173, boys n = 157) are presented below the diagonal. Means and standard deviations (within-level) are presented in vertical columns.
Note 3. **p < .001; [a] = statistical difference (independent t test, p < .05).

5.2.3 Student subgroups identified (Study V)

An additional aim (2b was to examine whether different student subgroups can be identified on the basis of the development of students' expectancy-related beliefs and task values across Grades 6 to 9. The GMM approach was conducted for the initial level and growth trajectories of students' expectancy-related beliefs and task values. The four-class solution was confirmed as the best according to four out of five criteria (see Table 6 for fit indices). Table 7 presents estimated means and standard deviations of the final mixture solutions. The first student subgroup (Group 1) comprised 52 (6.4%) students. These students had moderate expectancy-related beliefs (f_1 = 3.40) and low task values toward PE at Grade 6 (f_1 = 2.82). The members of Group 1 experienced a decrease in their expectancy-related beliefs (f_2 = -.47) during the middle school transition (T0-T1), and a subsequent slight increase across Grades 7 to 9 (T1-T5). In contrast, the PE task values of these students increased strongly (f_2 = 1.32) across the middle school transition (T0-T1), thereafter declining moderately across Grades 7 to 9. The second student group (Group 2) consisted of 95 (11.6%) students, who had moderate levels of expectancy-related beliefs (f_1 = 3.11) and task values (f_1 = 3.48) toward PE at Grade 6. Their expectancy-related beliefs decreased (f_2 = -.34) steeply during the middle school transition (T0-T1), but did not change across middle school (T1-T5). The PE task values of Group 2 declined (f_2 = -.87) steeply across the middle school transition (T0-T1). However, their task values increased across middle school (T1-T5). Group 3 was composed of 625 (77.0%) students who had high (f_1 = 4.18), relatively stable (f_2 = .06) values, but moderate, (f_1 = 3.51) decreasing (f_2 =-.03) expectancy-related beliefs toward PE. The task values of these students' increased temporarily during the middle school transition (T0-T1) while their expectancy-related beliefs decreased across the same period. However, their beliefs did not

change across middle school (T1-T5). Finally, Group 4 (40 students, 5.0%) had low levels of expectancy-related beliefs (f_1 = 2.38), but they valued (f_1 = 4.47) PE highly. This group of students maintained high values (f_2 = .06ns) across Grades 6 to 9 (T0-T5) while their expectancy-related beliefs increased (f_2 = 1.27) strongly during Grades 6 to 9 (T0-T5).

TABLE 6 Indices for Mixture Models with Different Numbers of Subpopulations (Latent Classes).

Number of classes	*log L*	*BIC*	*ABIC*	*AIC*	*VLMR*	*n (class 1)*	*n (class 2)*	*n (class 3)*	*n (class 4)*	*n (class 5)*
1	-5377.19	10940.068	10851.156	10810.372	-	812				
2	-5283.86	10786.571	10681.782	10633.715	.0001	678	134			
3	-5217.83	10678.670	10567.004	10511.654	.0225	99	25	688		
4	-5161.64	10608.457	10471.914	10409.281	.1002	52	95	625	40	
5	-5144.88	10678.103	10555.683	10505.767	.1906	25	621	107	28	31

Note. Log L = log likelihood; *VLMR* Vuong-Lo-Mendell-Rubin test *p* value.

TABLE 7 Estimated Descriptive Statistics and Final Latent Growth Models of Expectancy-Related Beliefs and Task Values for Estimated Subpopulations.

	Group 1 (n = 52)	Group 2 (n = 95)	Group 3 (n = 625)	Group 4 (n = 40)
Beliefs				
T0	3.35(.92)	3.08(.64)	3.52(.68)	2.36(.45)
T1	2.86(.65)	2.69(.67)	3.22(.72)	3.59(.69)
T3	2.97(.67)	2.81(.61)	3.21(.74)	3.61(.62)
T5	3.00(.71)	2.81(.67)	3.25(72)	3.42(.75)
Values				
T0	2.71(.71)	3.43(.79)	4.21(.50)	4.46(.60)
T1	3.98(.81)	2.32(.78)	4.41(.59)	4.51(.61)
T3	3.77(.98)	2.93(1.00)	4.15(.80)	4.55(.53)
T5	3.74(1.02)	3.19(.88)	4.17(.77)	4.45(.75)
Means				
Beliefs				
Level (f_1)	3.40 [.18]	3.11[.08]	3.51[.03]	2.38[.10]
Slope (f_2)	-.47 [.15]	-.34 [.05]	-.03[.02]	1.27[.15]
Values				
Level (f_1)	2.82[.16]	3.48[.13]	4.18[.03]	4.47[.16]
Slope (f_2)	1.32[.12]	-.87[.11]	.06[.02]	.06[.19]ns

Note 1. Standard deviations in parentheses and standard errors in brackets.
Note 2. Ns = possible non-significance of estimated components.

5.3 Students' motivational regulations in physical education

The descriptive findings, such as correlation coefficients, means, and standard deviations for the different motivational regulation variables, are presented in Table 8. The correlation matrix showed low to moderate positive correlations between intrinsic motivation, different forms of extrinsic regulations, and extrinsic motivation (r range from .06 to .67). The closer the measurement point in time, the stronger the correlations were. An inspection of the mean scores showed boys' to have statistically higher intrinsic motivation (T1), indentified regulation (T1 and T4), extrinsic motivation (T0-T5) and amotivation (T1, T4, and T5) in physical activity than girls.

TABLE 8 Summary of Intercorrelations, Means and Standard Deviations, and Cronbach's Alphas for Different Motivational Regulation Variables.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 IM (T0)	-	.42**	.31**	.36**	.34**	.21**	.79**	.40**	.31**	.27**	.29**	.18**	.53**	.19**	.13*	.21**	.23**	.13*
2 IM (T1)	.29**	-	.51**	.47**	.24**	.37**	.32**	.74**	.40**	.34**	.35**	.25**	.38**	.47**	.31**	.32**	.36**	.28**
3 IM (T2)	.29**	.46**	-	.58**	.28**	.42**	.28**	.44**	.75**	.40**	.40**	.32**	.31**	.26**	.50**	.28**	.36**	.20**
4 IM (T3)	.25**	.39**	.45**	-	.32**	.48**	.29**	.35**	.45**	.72**	.49**	.33**	.26**	.25**	.35**	.54**	.42**	.32**
5 IM (T4)	.12*	.20**	.19**	.31**	-	.26**	.26**	.24**	.25**	.25**	.40**	.20**	.17*	.20**	.17*	.21**	.30**	.15*
6 IM (T5)	.20**	.36**	.40**	.45**	.23**	-	.12*	.31**	.33**	.34**	.34**	.70**	.23**	.27**	.11*	.37**	.37**	.54**
7 ID (T0)	.82**	.25**	.22**	.30**	.08	.17*	-	.39**	.36**	.32**	.26**	.15*	.54**	.14*	.27**	.16*	.17*	.05
8 ID (T1)	.24**	.73**	.37**	.33**	.14*	.25**	.28**	-	.46**	.38**	.35**	.30**	.41**	.47**	.49**	.28**	.31**	.20**
9 ID (T2)	.26**	.38**	.78**	.35**	.16*	.30**	.26**	.42**	-	.49**	.45**	.36**	.33**	.20**	.32**	.24**	.31**	.13*
10 ID (T3)	.21**	.30**	.36**	.79**	.22**	.35**	.24**	.37**	.41**	-	.55**	.42**	.30**	.25**	.24**	.50**	.37**	.24**
11 ID (T4)	.12*	.26**	.31**	.34**	.40**	.31**	.14*	.35**	.41**	.42**	-	.39**	.28**	.28**	.45**	.37**	.54**	.26**
12 ID (T5)	.18**	.34**	.34**	.40**	.23**	.79**	.20**	.31**	.36**	.43**	.38**	-	.25**	.27**	.52**	.29**	.28**	.41**
13 INTR (T0)	.67**	.35**	.33**	.18**	.07	.16*	.65**	.32**	.33**	.18**	.20**	.17**	-	.57**	.45**	.38**	.43**	.31**
14 INTR (T1)	.18**	.55**	.30**	.25**	.17*	.16*	.19**	.49**	.29**	.22**	.28**	.14*	.47**	-	.52**	.52**	.53**	.49**
15 INTR (T2)	.20**	.34**	.69**	.30**	.21**	.28**	.20**	.29**	.70**	.30**	.38**	.27**	.39**	.43**	-	.56**	.57**	.43**
16 INTR (T3)	.22**	.33**	.33**	.62**	.30**	.27**	.20**	..28**	.35**	.63**	.39**	.25**	.33**	.43**	.50**	-	.67**	.60**
17 INTR (T4)	.17**	.28**	.36**	.38**	.39**	.39**	.16*	.29**	.36**	.39**	.68**	.36**	.33**	.42**	.49**	.55**	-	.59**
18 INTR (T5)	.13*	.26**	.32**	.29**	.18**	.58**	.13*	.22**	.31**	.28**	.34**	.59**	.28**	.31**	.40**	.43**	.53**	-
19 EX (T0)	.19**	.31**	.29**	.26**	.06	.23**	.68**	.35**	.39**	.34**	.24**	.31**	.66**	.27**	.33**	.34**	.26**	.25**
20 EX (T1)	.22**	.55**	.31**	.29**	.11*	.21**	.18**	.62**	.35**	.32**	.33**	.30**	.32**	.55**	.28**	.29**	.31**	.19**
21 EX (T2)	.25**	.33**	.68**	.32**	.14*	.26**	.22**	.37**	.74**	.39**	.38**	.31**	.25**	.34**	.64**	.37**	.40**	.32**
22 EX (T3)	.25**	.27**	.30**	.63**	.19**	.29**	.26**	.32**	.38**	.76**	.39**	.39**	.21**	.24**	.30**	.65**	.41**	.31**
23 EX (T4)	.15**	.28**	.27**	.38**	.38**	.33**	.13**	.31**	.33**	.43**	.71**	.41**	.28**	.30**	.31**	.43**	.70**	.33**
24 EX (T5)	.20**	.35**	.36**	.41**	.21**	.62**	.23**	.34**	.42**	.46**	.40**	.73**	.02	.25**	.33**	.39**	.47**	.64**
25 AM (T0)	.09	-.09	-.06	-.10*	-.03	-.11*	.12**	-.06	.01	-.02	-.04	-.06	0.06	-.03	.02	.05	-.01	-.04
26 AM (T1)	-.05	-.23**	-.15*	-.14**	-.09	-.22**	-.02	-.12**	-.10*	-.07	-.10	-.17*	-.06	-.12*	-.13*	-.08	-.18**	-.20
27 AM (T2)	-.06	-.02	-.01	-.11*	-.08	-.10	-.01	.03	.15*	-.02	.06	-.02	.01	.01	.05	-.07	-.01	-.07
28 AM (T3)	-.08	-.15*	-.17*	-.05	-.11*	-.17*	-.01	-.03	-.02	.13*	-.06	-.06	-.05	-.03	-.10*	.11*	-.02	-.03
29 AM (T4)	-.14*	-.12*	-.11*	-.05	-.08	-.13*	-.07	-.06	.02	.04	.09	-.08	-.06	-.01	-.02	.01	.08	-.06
30 AM (T5)	-.08	.02	-.02	-.03	-.12*	-.02	-.01	.03	.11*	.05	-.01	.12*	.01	.01	.04	.04	.03	-.01

M	3.12	3.30a	3.19	3.21	3.23	3.23	2.93	3.07a	3.08	3.01	3.09	3.12	3.33	3.44	3.20	3.27	3.22	2.48
SD	.64	.75	.73	.71	.68	.61	.65	.78	.77	.77	.71	.68	.69	.82	.74	.69	.67	.47
α	.93	.95	.94	.93	.94	.93	.90	.89	.91	.90	.91	.91	.85	.70	.71	.73	.77	.70

Note 1. Intercorrelations for girls (n = 382) are presented above the diagonal, and intercorrelations for boys (n = 430) are presented below the diagonal. Means, standard deviations, and Cronbach's alphas for girls are presented in vertical columns and means, deviations, and Cronbach's alphas for boys are presented in horizontal columns. IM = intrinsic motivation, ID = identified regulation, INTR = introjected motivation, EX = extrinsic motivation, and AM = amotivation.
Note 2. Sample size at Time 0 (T0) was 580 (girls = 270, boys = 310).
No*te 3.* **p < .001, *p < .05.

TABLE 8 Continues.

Variables	19	20	21	22	23	24	25	26	27	28	29	30	*M*	*SD*	α
1 IM (T0)	.48**	.23**	.12*	.21**	.22**	.16*	-.16*	-.13*	-.18**	-.15*	-.20**	-.14*	3.11	.66	.93
2 IM (T1)	.32**	.47**	.27**	.24**	.28**	.17*	-.26**	-.24**	-.23**	-.26**	-.31**	-.26**	3.14	.80	.92
3 IM (T2)	.31**	.32**	.53**	.27**	.29**	.23**	-.18**	-.21**	-.21**	-.27**	-.19**	-.23**	3.10	.73	.95
4 IM (T3)	.30**	.24**	.29**	.47**	.32**	.27**	-.19**	-.22**	-.30**	-.29**	-.26**	-.28**	3.13	.73	.94
5 IM (T4)	.16*	.15*	.12*	.19**	.30**	.18*	-.13*	-.12*	-.21**	-.17*	-.11*	-.17*	3.16	.69	.93
6 IM (T5)	.22**	.22**	.29**	.28**	.26**	.45**	-.14*	-.10	-.15*	-.18**	-.22**	-.17*	3.25	.71	.92
7 ID (T0)	.52**	.21**	.18*	.19**	.20**	.10	-.06	-.08	-.14*	-.09	-.16*	-.11*	2.87	.67	.90
8 ID (T1)	.38**	.55**	.34**	.28**	.30**	.20**	-.22**	-.20**	-.17*	-.23*	-.25**	-.20**	2.96	.83	.91
9 ID (T2)	.31**	.34**	.57**	.30**	.34**	.26**	-.13*	-.16*	-.12*	-.23**	-.12*	-.12*	3.02	.76	.90
10 ID (T3)	.35**	.33**	.38**	.57**	.42**	.37**	-.12*	-.16*	-.22**	-.22**	-.19**	-.20**	2.92	.78	.91
11 ID (T4)	.31**	.29**	.37**	.44**	.64**	.34**	-.16**	-.19**	-.19**	-.20**	-.11*	-.17*	2.99	.78	.89
12 ID (T5)	.31**	.27**	.35**	.35**	.35**	.63**	-.09	-.09	-.10	-.13*	-.19**	-.04	3.04	.74	.90
13 INTR (T0)	.58**	.34**	.24**	.27**	.26**	.21**	-.01	-.04	-.16**	-.05	-.14*	-.12*	3.28	.68	.84
14 INTR (T1)	.30**	.44**	.22**	.28**	.35**	.29**	-.09	-.06	-.14*	-.09	-.08	-.12*	3.48	.86	.75
15 INTR (T2)	.23**	.31**	.47**	.32**	.41**	.32**	-.09	-.14*	-.18*	-.17*	-.14*	-.13*	3.29	.70	.71
16 INTR (T3)	.26**	.23**	.24**	.48**	.40**	.35**	-.13*	-.16*	-.27**	-.23**	-.26**	-.19**	3.32	.76	.77
17 INTR (T4)	.28**	.27**	.29**	.38**	.53**	.33**	-.16**	-.20**	-.22**	-.20**	-.19**	-.23**	3.36	.80	.83
18 INTR (T5)	.25**	.22**	.21**	.30**	.29**	.47**	-.10	-.05	-.09	-.12*	-.20**	-.23**	2.56	.58	.70
19 EX (T0)	-	.57**	.46**	.47**	.41**	.42**	.18**	.06	-.03	.03	-.11*	-.05	2.44	.69	.87

20 EX (T1)	.46**	-	.48**	.40**	.48**	.41**	.01	.14*	-.08	-.06	-.08	-.10	2.52	.76	.89
21 EX (T2)	.44**	.48**	-	.56**	.52**	.52**	-.02	-.02	.17*	-.01	-.01	.03	2.69	.73	.90
22 EX (T3)	.48**	.41**	.49**	-	.67**	.63**	-.06	-.04	-.00	.08	-.01	.00	2.62	.73	.89
23 EX (T4)	.35**	.43**	.47**	.59**	-	.62**	-.08	-.03	-.02	-.03	.12*	.03	2.73	.77	.91
24 EX (T5)	.44**	.39**	.49**	.57**	.56**	-	-.04	-.01	.02	.06	.03	.18*	2.76	.78	.90
25 AM (T0)	.19**	-.01	-.01	.10	.03	.01	-	.65**	.34**	.39**	.40**	.30**	1.83	.69	.81
26 AM (T1)	.06	.07	-.07	.05	-.05	-.11*	.57**	-	.39**	.44**	.38**	.23**	2.07	.83	.80
27 AM (T2)	.11*	.07	.27**	.13*	.09	.11*	.31**	.31**	-	.51**	.43**	.41**	2.38	.81	.78
28 AM (T3)	.06	.01	.03	.28**	.07	.09	.39**	.45**	.46**	-	.53**	.43**	2.22	.81	.78
29 AM (T4)	.09	.05	.07	.20**	.28**	.13**	.32**	.31**	.38**	.55**	-	.54**	2.27	.84	.80
30 AM (T5)	.11*	.09	.13*	.15*	.12*	.35**	.29**	.25**	.47**	.49**	-.56**	-	2.27	.87	.81
M	2.75[a]	2.90[a]	2.94	2.93[a]	3.03[a]	2.99[a]	1.88	2.22[s]	2.47	2.29	2.45 [a]	2.43 [a]			
SD	.73	.76	.75	.79	.71	.65	.69	.86	.85	.86	.86	.88			
α	.88	.89	.90	.91	.89	.90	.83	.79	.80	.83	.83	.82			

Note 1. Intercorrelations for girls (n = 382) are presented above the diagonal, and intercorrelations for boys (n = 430) are presented below the diagonal. Means, standard deviations, and Cronbach's alphas for girls are presented in vertical columns and means, deviations, and Cronbach's alphas for boys are presented in horizontal columns. IM = intrinsic motivation, ID = identified regulation, INTR = introjected motivation, EX = extrinsic motivation, and AM = amotivation.
Note 2. Sample size at Time 0 (T0) was 580 (girls = 270, boys = 310).
No*te 3.* **p < .001, *p < .05.

5.3.1 Development of motivational regulations

The third aim of the study was to examine the development of students' motivational regulations in physical education across Grades 6 to 9. The LGCM technique was implemented and the fit of the models and estimated parameters are presented in Table 9. The results of the LGCM showed the students' intrinsic motivation (girls f_2 = .02, boys f_2 = .02), identified regulation (girls f_2 = .03, boys f_2 = .03), and extrinsic motivation (girls f_2 = .06, boys f_2 = .04) in physical education to increase moderately across the measurements. However, introjected regulation and amotivation showed different developmental trajectories. Girls' introjected regulation in physical education showed non-linear increasing growth (girls f_2 = .22), whereas in contrast boys showed contradictory linearly declining growth (boys f_2 = -.89) across time. Examination of the girls' introjected regulation trajectory revealed that the increase was only temporary, occurring during the middle school transition (T0-T1) (estimated values T2 = .14, T3 = .30, T4 = .47, and T5 = .48). In addition, students' amotivation in physical education followed a piece-wise growth trajectory. In other words, students' amotivation increased across Grades 6 and 7 (Slope 1, T0-T2) (girls' Slope 1, f_2 = .26; boys' Slope 1, f_2 = .27), but there was no change across Grades 8 and 9 (T3-T5). In this study the different Level components of motivational regulations were similar between the genders, except for extrinsic motivation, where the study showed boys to have higher levels of extrinsic motivation toward physical education than girls (girls f_1 = 2.46, boys f_1 = 2.81). Inspection of the variance of the Level and Slope constructs showed that the students were heterogeneous in their motivational regulations at the beginning of the study at Grade 6, after which they showed similar development across time. However, the variance of the Slope constructs for introjected regulation revealed students to be heterogeneous in their development across the measurements (girls ψ_{22} = .86, boys ψ_{22} = .39). In addition, examination of the covariance of the latent Level and Slope constructs for intrinsic motivation (only boys ψ_{21} = -.02), identified regulation (girls ψ_{21} = -.03, boys ψ_{21} = -.01), and introjected regulation (only boys ψ_{21} = -.16) showed that the students' growth trajectories grew increasingly similar across time. However, among the girls, individual differences in introjected regulation increased (girls ψ_{21} = .04), while no changes in individual differences were observed in the other forms of motivational regulations in physical education. Finally, two-group testing for gender similarity in the development of motivational regulations showed that development of students' motivational regulations in physical education was similar between the genders. However, gender differences were found in this study in the development of students' introjected regulation (see Appendix A for detailed information).

TABLE 9 Estimation Results for the Final Unconditional Latent Growth Models for Motivational Regulations.

Estimates of Parameters	IM	ID	INTR	EX	AM
Means					
Level (f_1)	3.11(.04) 3.12(.03)	2.89(.05) 2.97(.02)	3.25(.04) 3.37(.04)	2.46(.05) 2.81(.03)	1.82(.04) 1.88(.03)
Slope (f_2)	.02(.01) .02(.01)	.03(.01) .03(.01)	.22(.04) -.89(.04)	.06(.01) .04(.01)	.26(.03) (Slope1) /- .05(.03)ns (Slope 2) .27(.02) (Slope 1) / a0 (Slope 2)
Variances					
Level (ψ_{11})	.21(.06) .15(.04)	.26(.05) .16(.03)	.25(.03) .26(.04)	.29(.03) .28(.05)	.48(.05) .49(.04)
Slope (ψ_{22})	.01(.01) .01(.01)	.02(.01) .01(.01)	.01(.01) .39(.11)	.01(.01) .01(.01)	.11(.02) (Slope 1) / .04(.02) (Slope 2) .11(.02) (Slope 1) / .04(.02)
Covariance (ψ_{21})	-.01(01)ns -.02(.01)	-.03(.01) -.01(.01)	.04(.01) -.16(.03)	-.01(.01)ns -.01(.01)ns	-.14(03)ns (Slope 1) / -.02(.01)ns (Slope 2) a0 (Slope 1) / -.15(.02) (Slope 2)
Error variances					
ε_1	.22(.03) .27(.04)	.21(.06) .28(.05)	.29(.04) .24(.06)	.19(.04) .26(.05)	Ne .01(.05)ns
ε_2	.43(.03) .43(.04)	.47(.04) .44(.03)	.39(.04) .41(.04)	.28(.03) .34(.04)	.35(.03) .44(.05)
ε_3	.38(.05) .39(.06)	.37(.06) .41(.06)	.22(.03) .33(.05)	.28(.03) .31(.04)	.32(.05) .42(.08)
ε_4	.33(.04) .35(.04)	.30(.04) .38(.04)	.27(.04) .22(.03)	.21(.02) .32(.04)	.33(.04) .36(.04)
ε_5	.30(.05) .30(.05)	.24(.04) .25(.04)	.31(.04) .20(.03)	.25(.03) .24(.03)	.29(.04) .31(.04)
ε_6	.21(.06) .10(.03)	.11(.08) .17(.05)	.42(.07) .01(.08)ns	.19(.04) .16(.04)	.38(.06) .33(.06)
Fit of the model					

Girls	$\chi2(11) = 13.925$ $p = .237$ *CFI* = .99 *TLI* = .99 *RMSEA* = .027 90%, CI [.00, .06]	$\chi2(13) = 17.607$ $p = .173$ *CFI* = .99 *TLI* = .99 *RMSEA* = .032 90%, CI [.00, .06]	$\chi2(7) = 14.051$ $p = .050$ *CFI* = .99 *TLI* = .98 *RMSEA* = .057 90%, CI [.01, .10]	$\chi2(14) = 22.770$ $p = .064$ *CFI* = .99 *TLI* = .99 *RMSEA* = .042 90%, CI [.00, .07]	$\chi2(12) = 14.298$ $p = .282$ *CFI* = 1.00 *TLI* = .99 *RMSEA* = .023 90%, CI [.00, .06]
Boys	$\chi2(12) = 21.001$ $p = .050$ *CFI* = .96 *TLI* = .95 *RMSEA* = .047 90%, CI [.01, .07]	$\chi2(14) = 21.843$ $p = .082$ *CFI* = .97 *TLI* = .97 *RMSEA* = .038 90%, CI [.00, .06]	$\chi2(11) = 18.482$ $p = .071$ *CFI* = .99 *TLI* = .98 *RMSEA* = .041 90%, CI [.00, .07]	$\chi2(14) = 21.696$ $p = .085$ *CFI* = .98 *TLI* = .98 *RMSEA* = .037 90%, CI [.00, .07]	$\chi2(13) = 22.167$ $p = .050$ *CFI* = .96 *TLI* = .95 *RMSEA* = .054 90%, CI [.03, .08]

Note 1. The unstandardized solutions. Standard errors are in parentheses. [a]0 = fixed to be 0; ne = not estimated; ns = non-significance of estimated components. IM = intrinsic motivation, ID = identified regulation, INTR = introjected motivation, EX = extrinsic motivation, and AM = amotivation.
Note 2. For each pair of variables, the first number represents the girls' values and the second number represents the boys' values.
Note 3. Piece-wise growth of students' amotivation is presented: Slope 1 / Slope 2.

5.3.2 Student subgroups identified at Grade 6 (Study I)

An additional aim (3a) was to examine whether different student subgroups can be identified on the basis of their motivational regulations at Grade 6. The results of the cluster analyses showed that two different at Grade 6. Fifty-three percent of the students belonged in the "High motivation" group and 47% in the "Low motivation" group. The "High motivation" group had higher levels of intrinsic and extrinsic forms of motivation toward physical education than the "Low motivation" group. The study did not find differences between the two groups in amotivation. Table 10 presents the characteristics of the identified subgroups and the results of the independent *t* tests to test for statistical differences between the subgroups.

TABLE 10 Means and Standard Deviations of Estimated Motivational Subgroups.

	Cluster 1 (*n* = 229) "High motivation"		Cluster 2 (*n* = 200) "Low motivation"		*t* test		
Measure Scores	*M*	*SD*	*M*	*SD*	*t*	*p*	*df*
IM	3.74	.63	2.41	.73	19.93	<.001	394.31
ID	3.58	.68	2.17	.69	21.24	<.001	427
INTR	3.89	.65	2.67	.73	18.16	<.001	427
EX	3.19	.75	1.91	.61	19.18	<.001	427
AM	1.89	.95	1.79	.84	1.17	.224	427
PA	3.98	1.84	3.34	1.90	3.66	<.001	427

Note. IM = intrinsic motivation, ID = identified regulation, INTR = introjected motivation, EX = extrinsic motivation, AM = amotivation, and PA = physical activity.

5.4 Relationships between physical education motivation and physical activity

The fourth aim of the study was to examine the longitudinal relationships between physical education motivation and physical activity. The preliminary cross-sectional findings of Studies I and II found physical education motivation to relate to subsequent physical activity. Study I revealed that students' who were highly intrinsically and extrinsically (the "High motivation" group) motivated toward physical education at Grade 6 had higher levels of physical activity than those who were moderately motivated (the "Low motivation" group) (Table 10). In addition, Study II found peer groups' intrinsic values toward physical education at Grade 6 to relate to physical activity at Grade 7. The higher the level of intrinsic value of the peer group, the higher was the peer group members' physical activity. The individual level results for girls showed, in turn, that task values toward physical education were not related to their level of physical activity. By contrast, the association between boys' intrinsic value and physical activity was statistically significant. The results are presented in Fig-

ures 6 and 7. In addition, this study found peer group membership to moderate the relationship between the students' physical education task values and their physical activity (girls R^2 individual -level = .08ns, R^2 peer group -level = .42, boys R^2 individual -level = .13, R^2 peer group -level = .56).

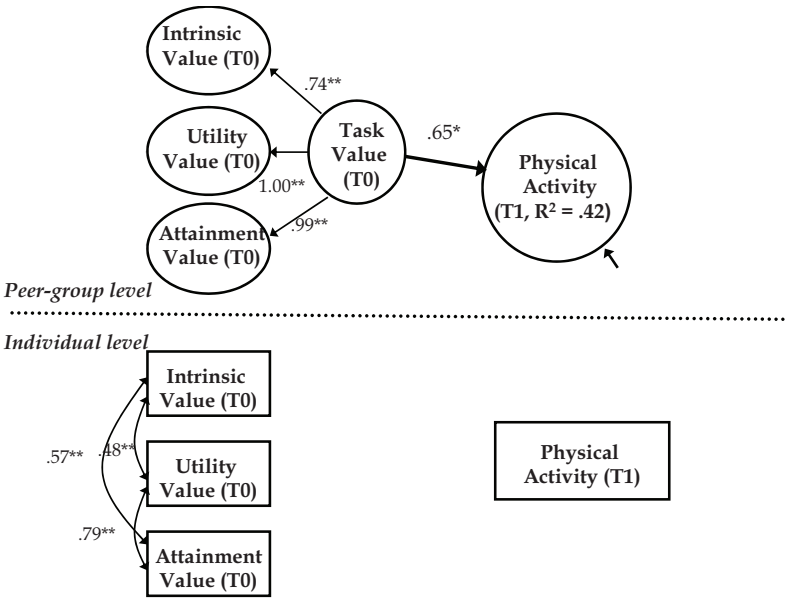


FIGURE 6 Multilevel model for girls' task values and physical activity. The paths and associations between variables are presented as standardized estimates. **p < .001.

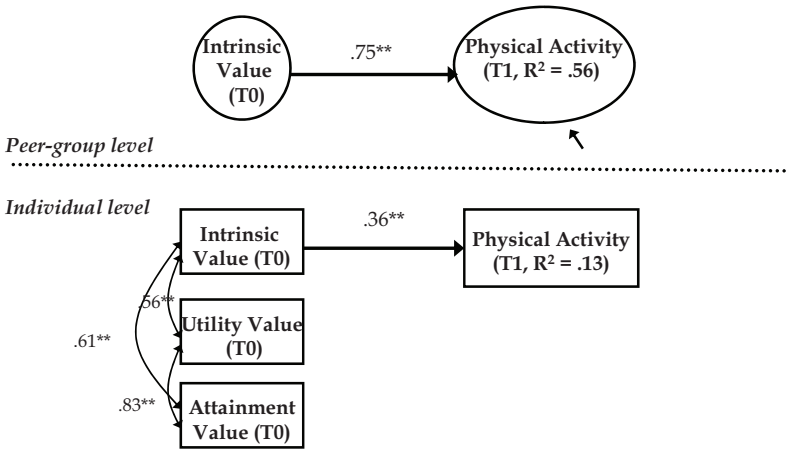


FIGURE 7 Multilevel model for boys' task values and physical activity. The paths and associations between variables are presented as standardized estimates. **p < .001.

5.4.1 Relationships between students' development of task values and physical activity across Grades 7 to 9 (Study III)

The aim (4a) was to extend the findings of Study II by testing the longitudinal relationship between students' task values and physical activity across Grades 7 to 9 when controlling for physical activity at Grade 6. This study found, first, that the level of students' physical activity at Grade 6 (T0) was positively associated with their physical activity at the beginning of Grade 7 (T1) (girls $\beta_0 = .61$, boys $\beta_0 = .34$). In addition, previous levels of task values and physical activity had a strong direct effect on subsequent task values (girls β range from .68 to .86, and boys β range from .81 to 1) and physical activity (girls β range from .55 to .58, boys β range from .69 to .82). Second, the examination of the prospective relationships showed that students' physical education task values had a direct effect on physical activity across the measurements. Furthermore, physical education task values at Grade 7 (T1) had an indirect effect on physical activity at Grade 9 (T5) via physical education task values at Grade 8 (T3), indicating that the more students valued tasks in physical education at Grade 7 the higher was their physical activity at Grade 9 (girls' indirect effect = .17, boys' indirect effect = .10). Furthermore, the results showed no gender differences in this developmental pattern. However, the predictive effect of students' task values in relation to their subsequent physical activity was stronger for boys (T3 R^2= .46, T5 R^2= .79) than for girls (T3 R^2= .37, T5 R^2= .39). The results are presented in Table 11. Detailed information on the testing for gender differences in

the development of task values in relation to subsequent physical activity can be found in Appendix A.

TABLE 11 Estimated Multivariate Simplex Models for Students' Physical Education Task Values and Physical Activity.

Estimates of Parameters	Girls	Boys
Means		
Task values T1 (τ_1)	4.20(1.15)	4.23(1.19)
Task values T2 (τ_2)	3.85(1.26)	4.12(1.96)
Task values T3 (τ_3)	3.93(1.20)	4.13(1.20)
PA T1 (τ_4)	4.05(.92)	4.45(.94)
PA T2 (τ_5)	3.64(.90)	4.15(.59)
PA T3 (τ_6)	3.94(.88)	3.80(.85)
R^2_2	.46	.65
R^2_3	.75	*1
R^2_4	.37	.67
R^2_5	.37	.46
R^2_6	.39	.79
Direct effects		
β_{50}	.61(.04)	.68(.06)
β_{21}	.68(.05)	.81(.08)
β_{32}	.58(.08)	*1
β_{54}	.55(.07)	.69(.06)
β_{65}	.58(.08)	.82(.07)
β_{51}	.14(.04)	.10(.05)
β_{62}	.14(.04)	.12(.06)
Indirect effects		
Task 1 – Task 2 – PA 3	.17(.06)	.10(.05)
Model fit	$\chi^2(8) = 8.92$ $p = .349$ *CFI* = 1.00 *TLI* = 1.00 *RMSEA* = .0174 90%, CI [.00, .06]	$\chi^2(10) = 17.13$ $p = .072$ *CFI* = .99 *TLI* = .98 *RMSEA* = .041 90%, CI [.00, .07]

Note 1. The unstandardized solutions. Standard errors are in parentheses. Task values = physical education task values, PA = physical activity, R^2 = reliability, τ = estimated means of the latent construct, β = path coefficients.
Note 2. Ns = possible non-significance of estimated components.

5.4.2 Development of physical activity of student subgroups identified

The final aim (4b) of the study was to examine whether the previously identified four student subgroups differ in their physical activity across Grades 6 to 9. The LGCM technique was implemented and the fit of the models and estimated parameters are presented in Table 12. First, linear models were implemented. All the models had poor fit indices and non-linear models were found better to represent the growth of students' physical activity. Consequently, several non-linear models were constructed. The best- fitted models were the models where the first (T0) factor loading was set at 0 and the last (T5) at 1. By doing so, the

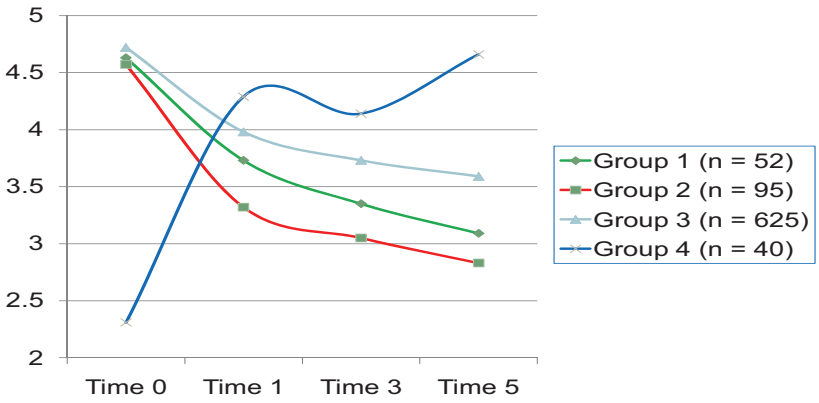
Slope was defined as the growth from Time 0 to Time 5 (Muthén, 2001). The results showed that the students who had the lowest expectancy-related beliefs and task values toward physical education also had both the lowest levels (f_1 = 4.57) and the steepest decline (f_2 = -1.73) in physical activity (Group 2). Although the students in Group 3 and Group 1 were rather similar in their physical activity behavior, Group 3 showed a less steep decline in physical activity (Group 3 f_2 = -1.12, Group 1 f_2 = -1.55). However, the physical activity of the students in Group 4 increased strongly (f_2 = 2.38) across Grade 6 to 9 (Figure 8).

TABLE 12 Estimated Descriptive Statistics and Final Latent Growth Models of Physical Activity for Estimated Subpopulations.

Estimates of Parameters	Group 1 (n = 52)	Group 2 (n = 95)	Group 3 (n = 625)	Group 4 (n = 40)
Means				
Level (f_1)	4.63(.11)	4.57(.07)	4.72(.02)	2.31(.23)
Growth (f_2)	-1.55(.20)	-1.73(.15)	-1.12(.05)	2.38(.26)
Variances				
Level (ψ_{11})	.95(.35)	1.14(.43)	.51(.08)	2.03(.83)
Change (ψ_{22})	1.14(.43)	1.89(.47)	1.12(.05)	2.34(.87)
Covariance (ψ_{21})	-.81(.31)	-.96(.46)	-.32(.09)	-.42(1.45)
Error variances				
ε_1	.42(.27)	.73(.35)	.26(.07)	.61(.30)
ε_2	1.47(.25)	1.22(.16)	.67(.06)	.25(.06)
ε_3	1.63(.29)	.87(.20)	.63(.05)	.21(.07)
ε_4	1.25(.43)	.78(.25)	.51(.07)	.61(.30)
Fit of the model	$\chi^2(2)$ = .261 p = .878 *CFI* = 1.00 *TLI* = 1.02 *RMSEA* < .001 90%, CI [.00, .15]	$\chi^2(3)$ = 2.404 p = .493 *CFI* = 1.00 *TLI* = 1.03 *RMSEA* < .001 90%, CI [.00, .16]	$\chi^2(2)$ = 3.564 p = .168 *CFI* = 1.00 *TLI* = .99 *RMSEA* = .039 90%, CI [.00, .10]	$\chi^2(2)$ = 2.543 p = .280 *CFI* = .99 *TLI* = .98 *RMSEA* = .066 90%, *CI* [.00, .31]

Note 1. The unstandardized solutions. Standard errors are in parentheses.
Note 2. Ns = possible non-significance of estimated components.

FIGURE 8 Estimated mean level curves for different estimated student subpopulations.



6 DISCUSSION

Physical education is considered to be one of the primary institutions to facilitate public health (McKenzie, 2007; Morgan et al., 2007). This increasing interest in public health can be attributed to the large body of knowledge showing that physical inactivity is associated with increased prevalence of over 25 chronic diseases (Chakravarthy & Booth, 2003). Although the role of physical education in physical activity is well established, primary evidence in support of this contention is limited. The present dissertation examined the development of, and gender differences in, students' physical activity and physical education motivation during the middle school transition across Grades 6 to 9. In addition, this study explored the longitudinal relationships between physical education motivation and physical activity. First, the results showed that students' physical activity and expectancy-related beliefs toward physical education declined across Grades 6 to 9, while students' valuing of tasks in physical education remained unchanged. The middle school transition from elementary school Grade 6 to middle school Grade 7 moderated the growth of students' expectancy-related beliefs and task values, accelerating the decline in expectancy-related beliefs and temporarily increasing task values. However, students' intrinsic and extrinsic motivation towards physical education increased moderately across Grades 6 to 9. Second, although boys consistently reported higher levels of physical activity, expectancy-related beliefs, and extrinsic motivation than girls, the development of physical activity and physical education motivation was similar. However, gender differences in task values widened across middle school, boys valuing the tasks of physical education more than girls. Third, the growth mixture modeling showed that the students with the lowest levels of, and the most negative development in, their expectancy-related beliefs and task values also showed the steepest decline in their physical activity. In addition, the students who valued physical education highly and experienced an increase in their expectancy-related beliefs toward physical education became more physically active across time.

6.1 Students' physical activity

The results of the present dissertation showed that students' physical activity decreased across Grades 6 to 9. Examination of the growth trajectories revealed the decline to be linear across middle school Grades 7 to 9. However, examination of the mean level of students' physical activity across Grades 6 to 9 in turn revealed that the decline accelerated during the middle school transition. This study showed students to vary greatly in their activity levels, some students being physically very active and other inactive. However, individual differences diminished across the measurements. In addition, although boys were found to be more active than girls, there were no gender differences in the development of physical activity across time.

These results support previous findings indicating a decreasing trend and gender differences in the physical activity of 12- to 15-year-old students (Currie et al., 2008; Duncan et al., 2007; van der Horst et al., 2007; van Mechelen et al., 2000; Nader et al., 2008; Telama & Yang, 2000; Telama et al., 1997; Telama et al., 2005). In addition, this study supported the study by Duncan et al. (2007) study, showing that individual differences between adolescents' diminished across middle school. Finally, extending the previous, partly contradictory findings on gender differences, this study further supported the findings of Duncan et al. (2007), indicating gender similarities in the growth trajectories of students' physical activity.

The reasons behind the decrease in students' physical activity are in large part beyond the scope of this study. Therefore, it is important to refrain from drawing excessive conclusions. Systematic reviews have presented empirical findings suggesting differential effects for biological, demographic, psychological, behavioral, and social correlates of adolescents' physical activity (van der Horst, et al., 2007; Sallis et al., 2000). However, the steep decrease observed here in physical activity during the middle school transition indicates that there might be contextual reasons that contribute to this decrease. Previously, increased homework load and screen time related to studying or simply increased sedentary behavior in middle school have been found to be associated with the decrease in physical activity (see review by Biddle, Pearson, Ross, & Braithwaite, 2010).

This study showed that students' physical activity behavior converged, physically more active students experiencing a greater decrease in their physical activity than less active students. This finding might be due to the socialization process or to influence of the physical education class or peer network. Previous research has shown peer pressure and actual encouragement or discouragement to be influential via group values, expectations, and social acceptance, and status to be associated with school students' behaviors (Chen, Chang, & He, 2003; Kindermann, McCollam, & Gibson, 1996; Ryan, 2001; Smith, 2003). The longitudinal relationship between students' physical education motivation

and the development of physical activity is discussed in detail later in this dissertation.

6.2 Students' expectancy-related beliefs and task values in physical education

The results showed that students' expectancy-related beliefs decreased across Grades 6 to 9, the decline accelerating during the middle school transition. Furthermore, the results revealed that individual differences diminished across time. In other words, students became increasingly similar across their school years. It might be that students' who had high, possibly unrealistic beliefs about their ability and unrealistic hopes for success during elementary school experienced a steeper decline in their expectancy-related beliefs than less competent students. Alternatively, it is possible that less competent students' experienced a smaller decrease in their expectancy-related beliefs. These findings support previous mean level longitudinal findings in academic education and school sports (Eccles et al., 1989; Wigfield & Eccles, 2000; Wigfield et al., 1991). Similar findings have been obtained with closely related concepts, such as self-efficacy or perceived competence (Bandura, 1997; Harter, 1982). However, several studies have not found the decline of students' expectancy-related beliefs to accelerate across the middle school transition. First, Frederics and Eccles (2002) and Wigfield & Eccles (2002) found the decline in students' beliefs in school sports to decrease steadily across elementary and middle school. Second, Jacobs et al. (2002) found the decreasing trend in students' competence beliefs to accelerate until the last grades of middle school.

There are at least three possible explanations for these findings. First, students' cognitive development might in part explain the decrease in their expectancy-related beliefs. Young children have been found to have relatively high self-perceptions of competence, those self-perceptions becoming more modest and realistic as they move into later grades (Frey & Ruble, 1987; Harter, 1985; Stipek, 1984). Second, it is likely that the contextual change in the school environment when transitioning from elementary school to middle school, may affect students' expectancy-related beliefs. As several researchers have pointed out (Blumenfeld, Pintrich, Meece, & Wessels, 1982; Eccles & Midgley, 1989; Eccles et al., 1993), elementary and middle schools differ in organizational and structural ways that can influence students' ability perceptions. The nature of the classroom changes from a class teacher format to a subject teacher format. In addition, research has shown that in middle school the nature of teacher evaluations is more normative and less task-oriented than it is in elementary school (Anderman, Maehr, & Midgley, 1999; Anderman & Midgley, 1997). Third, some researchers have suggested that these changes are associated with biological maturation, such as pubertal development, which has been shown to relate to lower self-esteem and perceived competence (see review Malina et al., 2004).

In this study, boys had higher expectancy-related beliefs toward physical education than girls, confirming the mean level gender differences found in previous studies (Eccles & Harold, 1991; Eccles et al., 1993; Gao & Xiang, 2008; Harter, 1982; Wigfield et al., 1997; Xiang et al., 2003). These gender differences have been found in different domains, boys having higher expectancy-related beliefs in mathematics and sports and girls having higher beliefs in English (see review Wigfield et al., 2006). In addition, previous research with a Finnish sample has shown boys to enjoy physical education more (Soini, Liukkonen, Jaakkola, Leskinen, & Rantanen, 2007) and to have higher self-perceptions of their competence in physical education (Jaakkola, 2002) than girls. However, although boys had higher levels of expectancy-related beliefs toward physical education, as also in Jacobs et al. (2002), this study found no gender differences in the development of students' expectancy-related beliefs.

Scholars have posited that gender differences might be due to the adoption of gender-role stereotypes, which can occur because of children's need to feel socially accepted (Lee et al., 1999). For example, boys may be expected by others to play masculine-typed tasks (e.g., basketball and football), while girls may be expected to participate in feminine-typed tasks (e.g., dance and gymnastics). These socially constructed gender-role stereotypes might pressure both boys and girls to behave in ways that will satisfy the expectations of society. Although Finland is among few European countries to have single-gender physical education, the current national curriculum lays down the same objectives for girls and boys (Finnish National Board of Education, 2004). However, recent research has found gender differences in the actual implementation of the curriculum (Berg, 2009). It might be that despite efforts to enhance girls' physical activity, the implementation of curriculum supports the needs of the boys to the detriment of girls' interests. However, this study did not find gender differences in the growth pattern of expectancy-related beliefs. Therefore, the results of the study conflict with the gendered socialization theories suggesting gender differences grow larger across time (e.g., Hill & Lynch, 1983).

The results showed a different growth trajectory when comparing the growth of expectancy-related beliefs and task values toward physical education. Students' task values were rather stable across time (increasing temporarily across Grades 6 to 7). This result conflicts with those of previous studies where students' task values toward physical education have declined with age (Eccles et al., 1989; Jacobs et al., 2002; Wigfield et al., 1991). Furthermore, the results showed an increase in individual differences between students in their valuing of tasks in physical education. It might be that school physical education enhances the values of students who already started out with high physical education values. On the contrary, it might be that some students, who started out with lower levels of values toward physical education, grow to value physical education even less than before. In sum, these results in students' task values conflict with previous findings, which have shown task values toward school sports to decrease across middle school years.

The present findings suggest that contextual reasons may contribute to students' changes in their expectancy-related beliefs and task values towards physical education. Although it is possible that a new school and new peers may increase normative comparison and, therefore, accelerate the decrease in students' expectancy-related beliefs, it is also possible that the change of physical education teacher, when students enter middle school, enhance this temporary change in task values. In the Finnish school system elementary school physical education is taught by general teachers, while middle school physical education is taught by specialized physical education teachers. Previous studies have shown that specialized physical education teachers in middle school level support students' needs in physical education better than do general teachers (Constantinides, 2007; Davis, Burgeson, Brener, McManus, & Wechsler, 2005).

This study extended the previous, partly contradictory findings regarding gender differences in physical education task values (Eccles & Wigfield, 1995; Eccles et al., 1993; Fredericks & Eccles, 2002; Jacobs et al., 2002; Wigfield et al., 1997). Specifically, this study found no gender differences at Grade 6, but gender differences were observed during middle school. Examination of gender differences in the growth trajectories revealed that girls' and boys' growth trajectories were different and that gender differences grew larger across middle school. These findings conflict with previous results, where gender differences were either stable (Fredricks & Eccles, 2002) or decreased (Jacobs et al., 2002) across middle school.

An additional aim of this study was to extend previous research by examining gender differences in different dimensions of task values, such as attainment, utility, and intrinsic values. The results showed gender differences at Grade 6, girls valuing physical education for both intrinsic (i.e., interest) and extrinsic (i.e., attainment and utility) reasons, whereas boys were found to have only intrinsic values toward physical education. This finding conflicts with that of Fredricks and Eccles (2002), who found boys to have higher interest in and to attribute greater importance toward school sports, and Xiang et al. (2006), who reported finding no gender differences in task values toward a physical education running program. It is, however, noteworthy that Fredricks and Eccles (2002) examined school sports, while the present study examined school physical education. In addition, Xiang et al. (2006) examined fourth graders' task values toward a physical education running course. This task is rather specific compared to the more general concept of school physical education tasks measured in the present study. Furthermore, this study extended previous findings by examining peer group similarities in task values toward physical education. The results showed girls' peer groups to share more heterogeneous values toward physical education than boys. The study revealed that girls' peer groups valued physical education through attainment, utility, and intrinsic values. Instead, boys valued physical education only due for intrinsic reasons. It is not possible to pinpoint the reasons behind these findings. It is possible that students' choose friends because they share similar values, e.g. toward physical education (Kindermann et al., 1996) or, alternatively, students converge in their

values across time (Finnerty, Reeves, Dabinett, Jeanes, & Vögele, 2010). For example, a physically inactive individual might feel an urge to adopt a more critical opinion regarding physical education to blend in with the peer group.

Finally, an additional aim was to investigate whether different subgroups of students can be identified based on the initial level of, and growth in, their expectancy-related beliefs and task values toward physical education. This study found that three out of four of the groups identified (Groups 1, 2, and 3) experienced a decrease in their expectancy-related beliefs in physical education. This decline was evident despite their beliefs at Grade 6 and the level and growth of their task values. However, an interesting finding was that 5% (Group 4) of the students experienced an increase in their expectancy-related beliefs toward physical education. Previous studies have utilized a person-oriented approach, using cluster-analysis to identify possible subgroups on the basis of their motivational regulations in physical education (Boiché, Sarrazin, Grouzet, Pelletier, & Chanal, 2008; Braten, & Olaussen, 2005; Meece & Holt, 1993; Ntoumanis, 2002; Ullrich-French & Cox, 2009; Wang, Chatzisarantis, Spray, & Biddle, 2002). In these studies two to five clusters have been found, indicating that motivation might be culture-related and, therefore, difficult to generalize. Furthermore, the fact of different conceptualizations of physical education motivation makes it difficult to compare the findings of previous studies and the present study. An important contribution made by this study is that it extends the findings of previous studies by examining the role of the longitudinal growth of physical education motivation when tracking different student populations.

6.3 Students' motivational regulations in physical education

The results of the present study showed a moderate increase in students' intrinsic motivation, identified regulation, and extrinsic motivation toward physical education across Grades 6 to 9. In addition, this study found students' amotivation to increase across Grades 6 and 7 and to level off across Grades 8 and 9. However, this study documented a temporary increase in girls' introjected regulation during the middle school transition while boys' introjected regulation declined across time. Furthermore, this study showed that students' individual differences in autonomous motivation (intrinsic motivation and identified regulation) diminished across time. It may be that more non-autonomously (introjected regulation, extrinsic motivation, and amotivation) motivated students grew to be more autonomously motivated across time. Although the results of this study conflict with the findings of Ntoumanis et al. (2009) with a Greek sample (similar timeframe and age group), these findings partially support the findings of Taylor et al. (2010) with a British sample (one year time frame and mean level results). Ntoumanis et al. (2009) found autonomous motivation to decrease and no change in non-autonomous motivation across Greek middle school (ages 13–15-years). In contrast, Taylor et al., (2010) found mean levels of

11- to 16-year-old British school students' autonomous and non-autonomous motivation to increase across one school year. Furthermore, the findings of the present study are in conflict with the results found in an academic context (Harter, 1981; Gottfried et al., 2001; Otis, Frederick, Grouzet, & Pelletier, 2005). For instance, Otis et al. (2005) found students' academic intrinsic motivation, identified and introjected regulation, and extrinsic motivation to decrease and amotivation to be unchanged in a 3-year longitudinal study.

This study found gender similarities in the development of motivational regulations in physical education, extending the existing literature by partially confirming the findings of Ntoumanis et al. (2009). Boys' were found to be consistently more extrinsically motivated toward physical education. This finding echoes the findings in the academic domain, demonstrating higher extrinsic motivation among boys (Anderman & Anderman, 1999; Midgley & Urdan, 1995). The present study found gender differences in the development of introjected regulation toward physical education. Scholars have argued that introjected regulation is an important part of extrinsic motivation, as it indicates the existence of the internalization process, that is, individual transfer towards more autonomous motivation (Gillison, Osborn, Standage, & Skevington, 2009). However, the declining trend of introjected regulation among boys may have contributed to the increased levels of intrinsic motivation and identified regulation found in this study. It might be that when the individual approaches the first stages of the internalization process, he or she has not yet gathered sufficient experience to become competent at, and familiar with, the new activity. Alternatively, it is possible that the increase in boys' extrinsic motivation is due to transfer in the opposite direction, from introjected regulation toward extrinsic physical education motivation.

An additional aim of this study was to examine whether different student subgroups can be identified on the basis of their motivational regulations at Grade 6. The results showed that Finnish Grade 6 students were highly motivated toward physical education and that their motivation derives from both intrinsic and extrinsic sources. Two different subgroups ("High motivation" and "Low motivation") based on motivational regulations were identified. Previous studies have identified three profiles ("High motivation", "Moderate motivation", and "Low motivation") representing students' motivation toward physical education (Boichè et al., 2008; Moreno, Hellín, Hellín, Cervelló, & Sicilia, 2008; Ntoumanis, 2002). Comparison between the means of the subgroups identified in this study and those of previous (Boichè et al., 2008; Moreno et al., 2008; Ntoumanis, 2002) studies showed that the means of the "Moderate motivation" subgroups of the previous studies were in fact similar to the mean levels of the "Low motivation" profile of the present study. This finding suggests that it is possible that there are fewer students who have low motivation toward physical education in Finnish schools than in French (Boichè et al., 2008), Spanish (Moreno et al., 2008), or British (Ntoumanis, 2002) schools.

There are several explanations for the increase found in students' intrinsic and extrinsic motivation in physical education. First, previous research has

shown that Finnish physical education classes are relatively autonomous and task supportive (Soini et al., 2007). In addition, the study by Ntoumanis et al. (2009) reported that the decrease in students' intrinsic motivation was accompanied by a decrease in students' perception of their motivational climate, more specifically, a decrease in their perceptions of a task-involving motivational climate. A task-involving climate in physical education classes has been found to facilitate intrinsic motivation (see review Roberts, Treasure, & Conroy, 2007). Changes in motivational climate were not reported in the present study, but it is possible that Finnish physical education teachers are able to support the development of students' task orientation during middle school physical education lessons and, therefore, may enhance the development of autonomous motivation. Second, scholars have reported an increase in extrinsic motivation due to students' increased social comparison with peers (Dweck, 2002; Wigfield et al., 1996) and more normative and competitive teaching practices (Dweck, 2002; Eccles & Midgley, 1989; Wigfield, Eccles, & Rodriquez, 1998; Wigfield et al., 1996). Although no comparative studies exist on the evaluation of physical education during elementary and middle school, it is possible that the evaluation of physical education shifts toward a more normative evaluation in middle school. This evaluative shift may facilitate the increase found in extrinsic motivation toward physical education. In addition, scholars have examined the role of motivational regulations in the domains of physical education and physical activity (see review by Hagger & Chatzisarantis, 2007). An overview of the role of self-determination in understanding the special nature of physical activity behavior (Ryan et al., 2009) has suggested that many people engage in exercise activities not because they find the activities are inherently interesting and enjoyable (intrinsic motivation), but because they have something to gain (extrinsic motivation) by it. In the school physical education context, this may include health benefits, appearance, or good grades. Therefore, Ryan et al. (2009) suggest that extrinsic motivation is extremely important in the domain of activities which are physical in nature. Third, this study found students' amotivation toward physical education to be rather low. Moreover, it was not possible to separate different student subgroups based on their amotivation. It is possible that the increase in amotivation levels identified in this study were due to increased values of already moderately amotivated students.

In sum, this study supports the conclusion of Lepper et al. (2005) in the classroom context, suggesting that intrinsic and extrinsic motivation can coexist. The critical issue may not be whether students' are intrinsically or extrinsically motivated toward physical education, but how much motivation in total students display (Lepper et al., 2005). In fact, it may be beneficial for students to seek out activities that they find inherently pleasurable, while simultaneously valuing the extrinsic consequences of those activities. Seeking only short-term immediate enjoyment with no attention to external contingencies and constraints may substantially reduce a student's future outcomes and opportunities. Conversely, attending only to extrinsic constraints and incentives can substan-

tially undermine intrinsic interest and the enjoyment that can come from learning or participating itself.

6.4 Longitudinal relationship between students' physical education motivation and physical activity

This study contributes to the existing literature by examining the longitudinal relationships between physical activity and physical education motivation. The preliminary cross-sectional findings of this study indicated that higher levels of both intrinsic and extrinsic motivation at Grade 6 related to higher levels of physical activity. This finding supports the general trend in the literature that more positive constructs representing theoretical antecedents and consequences are experienced by individuals with more autonomous motivation (Cox et al., 2008; Hagger et al., 2003; Ntoumanis, 2005; Ullrich-French & Cox, 2009). In addition, this finding indicates that greater levels of autonomous motivation, regardless of non-autonomous motivation levels, are associated with higher levels of physical activity. In line with the findings of Ullrich-French and Cox (2009), the present results suggest that intrinsic motivation and identified regulation may supersede more extrinsic forms of motivation in the physical education setting. More specifically, having high levels of extrinsic motivation was not non-autonomous when combined with high levels of autonomous forms of motivation. However, scholars have suggested that extrinsic motivation toward an activity may have long term negative consequences compared to the outcomes of more intrinsic motivation (Gillison et al., 2009).

This study found that the intrinsic value typical of the peer group at Grade 6 was related to the group members' physical activity at Grade 7. The higher the intrinsic value of the peer group, the higher the peer group members' physical activity. A possible explanation for this finding is that peer groups' intrinsic physical education task values affect group members' later physical activity (i.e., peer influence). Alternatively, it is also possible that adolescents who have initially been physically active and have valued physical education may have sought each other's company and formed peer groups together (i.e., peer selection). Conversely, adolescents who have been physically passive and devalued physical activity may also have sought each other's company on the basis of similarity and shared interests. The individual-level results for girls in turn showed that task values toward physical education were not related to their physical activity. In contrast, for boys all three task values were positively related to physical activity at the individual level, but when task values were controlled for, only the association between intrinsic value and physical activity was statistically significant. Generally, the results of this study indicate that intrinsic types of values, such as interest in physical education, are among the most important determinants of physical activity for both girls and boys. However, among girls only the intrinsic value of the peer group played a role, while

among boys both their peer group and their own task values—after accounting for peer group effect—were associated with physical activity. The findings support the results of the study of Xiang et al. (2004a), who found that the intrinsic motivation construct played the most important role in predicting future motivation toward a running program. Furthermore, the results support previous studies that have emphasized the relationship between positive physical education experiences and physical activity (Dishman et al., 2005; Sallis et al., 2000). Girls seem to be more sensitive than boys to their peer group's prevailing values toward physical education. If so, it can be argued that girls' interest in physical activity can be enhanced if it is supported by the peer group.

This study found students' task values toward physical education to be related to their physical activity across middle school, and to show similarities in longitudinal growth. Testing of the cross-lagged relations of students' physical education task values and physical activity indicated that students' physical education task values had a predictive effect on their physical activity across middle school. The results showed further that this impact of physical education task values at Grade 7 extended to physical activity at Grade 9 as an indirect effect via physical education task values at Grade 8. These findings indicate that students' task values predict the longitudinal development of students' physical activity across middle school. Although boys had higher values toward physical education, there were no gender differences in this pattern. The study showed this prediction power to be stronger for boys than girls. Although new findings in the physical education motivation context, these results echo previous findings on students' valuing of physical education and intentions to participate in various physical activity programs (Gao & Xiang, 2008; Xiang et al., 2004a; Xiang et al., 2003), academic school subjects, and performance (for a review, see Murphy & Alexander, 2000).

Finally, when widening the time frame to include examination of the middle school transition and controlling for the role of students' expectancy-related beliefs, it was possible to better understand the relationships between students' expectancy-related beliefs and task values toward physical education and physical activity. Four student subgroups were identified based on the development of students' expectancy-related beliefs and task values toward physical education and each of these subgroups showed a different pattern in their physical activity development across Grades 6 to 9. The results showed, first, that the subgroup of students with the lowest expectancy-related beliefs and task values toward physical education, showed the most negative development of physical activity across Grades 6 to 9 (Group 2, n = 95). This declining trend in physical activity was steepest during the middle school transition and was accompanied by a steep decline in expectancy-related beliefs during the same period. However, the task values of this subgroup increased and their expectancy-related beliefs toward physical education were stable during middle school. On average, these students were physically active only during their two weekly obligatory physical education lessons. Second, Groups 1 and 3 were similar in the development of their expectancy- related beliefs and task values toward physical education as well as

physical activity, but the valuing of physical education was higher in Group 3, while in Group 1 the students' task values were only low to moderate, thus increasing across time. Group 3 had higher levels of physical activity and a less steep decrease in physical activity across the measurements. In addition, Group 3 formed 77% of the sample (n = 625) while Group 1 comprised only 6.4% (n = 52) of the students. Fourth, this study identified one student subgroup (Groups 4, n = 40) who showed a strong increase in their physical activity. This increase was accompanied with steep growth in their expectancy-related beliefs and high unchanged task values toward physical education.

These findings in the role of students' expectancy-related beliefs and task values toward physical education in determining the growth of physical activity might be due to two reasons. First, it is likely that if students' feel that they are able successfully to complete different tasks during their physical education classes, they might be more active during physical education lessons and encouraged to start new activities in their leisure-time (Cox et al., 2008; Shen et al., 2008). It is difficult to point to an exact mechanism through which positive beliefs translate into physical activity, as students may feel competent in various ways (Bouffard, Watkinson, Thomson, Causgrove Dunn, 1996; Okely, Booth, & Patterson, 2001; Wrotniak, Epstein, Dorn, Jones, & Kondilis, 2006). For instance, findings have shown that good coordination and physical fitness along with feelings of adequacy in motor activities may lead to increased motivation to participate in physical activity (Bouffard et al., 1996; Okely et al., 2001; Wrotniak et al., 2006). Participation may also be influenced by the immediate context or environment. Positive responses from parents, teachers, and peers may further enhance students' engagement in physical activity (Smith, 2003). Second, these findings indicate that physical education task values alone do not contribute to positive development of physical activity. This study suggests that value might have some predictive relation to physical activity behavior, but it is likely that this relation operates together with expectancy-related beliefs, as hypothesized by Eccles et al. (1983).

Taken together, these findings investigating the longitudinal relationships between students' physical education expectancy-related beliefs, task values, motivational regulations, and subsequent physical activity have interesting implications. High expectancy-related beliefs, task values, and intrinsic and extrinsic motivation were related with positive physical activity levels. Correlations in themselves, of course, do not provide causal evidence on the relations between the factors studied. However, the examination of the longitudinal growth of the different motivational determinants of physical education motivation and physical activity found similarities in their development, which could be due to a causal relationship. In addition, by applying person-oriented approach this study was able to identify how physical activity in differently motivated students develops across time. The findings of this study thus indicate that this relation might be more complex than has been assumed. In this study low levels and negative development of expectancy-related beliefs and task values were related to the steepest decrease in physical activity behavior.

In addition, high valuing and positive development of expectancy and ability beliefs in physical education led to increased physical activity during Grades 6 to 9. This study supports the conclusion of Ryan and Deci (2000) that students do not participate in physical activity if they do not value it, despite the fact that they might believe themselves capable of succeeding in it.

6.5 Practical implications

The results of the research conducted for this dissertation have practical implications for physical educators. High expectancy-related beliefs and task values toward physical education as well as high intrinsic and extrinsic motivation in physical education were related to students' physical activity. Previous research has evidenced that schools that have shared values and goals function better and are more effective than other schools (Muncey & McQuilla, 1993). If the whole school supports physical activity against sedentary behavior, the efforts of physical educators are more likely to be effective. The following recommendations for increasing physical education motivation concern the entire school community (and not just physical educators).

a) Schools should develop common school norms and values that support physical education, physical activity, and doing well in school in general. In such schools, students are encouraged to do their best, offered a challenging curriculum, hold high standards, and are provided with extra help and tutoring to achieve those standards.

b) Schools should build up a sense of school belonging. The self-determination theory (Deci & Ryan, 1985) emphasizes the importance of relatedness as a basic need for children of all ages. A sense of school belonging involves feelings of being accepted by peers and teachers, as well as identifying with the values and goals of schooling (Goodenow, 1993).

c) It is important that physical educators design tasks and work structures that foster students' engagement and autonomy. There are many ways in which the physical education teacher can develop meaningful tasks to facilitate everyday school work. One of the most widely adopted models in the physical education context is the TARGET model by Epstein (1989). This model aims to enhance students' intrinsic motivation, task orientation, and interaction by providing them with meaningful tasks, shared authority, recognition, meaningful grouping, individual evaluation, and a sufficient amount of time for learning.

d) Physical education teachers should offer students rationales that include discussion of the utility value and importance of physical education and physical activity. Increasing awareness of the benefits of an activity at

the beginning of the lesson may be more effective for children, especially when the outcomes of the activity are highly valued. For example, teachers can talk to the class about the likely outcomes and possible benefits of the activity (e.g., learning team work, decreasing stress, and enhancing self-esteem) to children and help students to experience these and other positive outcomes (e.g., feeling competence and developing relationships).

e) Teachers should model value and interest in the content of the lesson. In addition, designing a curriculum that holds students' interest is always a challenge. Considering that one of the important goals is to foster students' interest in physical education, it is crucial for physical educators to present learning activities in interesting, novel, and meaningful ways. This will encourage students from a large variety of skill levels and backgrounds to be actively engaged in the activities taught during physical education classes.

f) Physical education teachers should provide students with tasks which are challenging, but within reason in terms of students' capabilities. Suitable goals and tasks have been found to relate to positive outcomes of the activity (Chatzisarantis & Hagger, 2009; Goudas et al., 1995; Hagger et al., 2005; Hagger et al., 2003; Ntoumanis, 2001; Standage et al., 2005). To this end, educators need to adapt learning to individuals' ability levels and allow them to achieve a sense of success and establish and maintain positive ability perceptions, provide accurate and timely feedback, and use role models to provide vicarious experiences.

6.6 Limitations and future research

The following limitations should be taken into account in efforts to generalize these results. First, this study assessed students' physical activity using self-report measures. Scholars have advocated the usage of objective methods, such as accelerometers and pedometers to strengthen the measurement reliability and validity (Shephard, 2003). Nader et al. (2008) noted that assessments of physical activity are often higher when self-report activity measures are used as compared with objective measures. However, the validity and reliability of the World Health Organization's HBSC study has been shown to be acceptable when measuring children's and adolescents' physical activity (Booth et al., 2001; Prochaska et al., 2001; Vuori et al., 2005). Second, Studies I and II used only a part of the larger original sample represented in Studies III–V. This was due to the fact that a part of the sample only joined the research project at the beginning of middle school, at Grade 7. These students arrived from different school districts and thus their elementary school records were not available. Although examination of the mean-level differences between this subsample and the tar-

get sample found no statistically significant differences, it is possible that the subsample differed from the target sample at Grade 6.

Future research should take into account the limitations of this dissertation study. First, it is important that physical activity is measured using different approaches such as observation, hearth rate monitoring, accelerometry, and various criterion methods to increase the reliability and validity of findings based on e.g. self-report measures. Second, to increase understanding of students' motivation toward physical education, future research should better define the concept of motivation. This study examined motivation as overall physical education motivation. However, the highly miscellaneous nature of the physical education curriculum means that students' motivation can vary between different courses. Hence, future studies are needed to examine students' situational motivation to better understand the relationships between motivation and desired outcomes. Third, this study revealed that students were motivated toward physical education in both intrinsic and extrinsic ways. In addition, intrinsic and extrinsic motivation showed similar developmental growth across middle school. Future studies should determine whether this is solely a Finnish phenomenon due to the special features of the Finnish schooling system or whether this is generalizable across different cultures. Alternatively, future studies should determine the influence of context in the development of physical education motivation. It is possible, that a constraining school context can partly facilitate extrinsic motivation. Fourth, the findings of this study suggest that physical education motivation and physical activity are interrelated in complex ways. Motivation is highly individual and, therefore, this study recommends applying a longitudinal methodology, which allows appropriate measures of individual growth. The aim of this study was to examine the relationship between the development of physical education motivation and physical activity. Future studies should examine the role of possible mediators, such as affect, physical activity intention, and actual motivation toward physical activity, in this relationship. Finally, there is a need for experimental manipulation of motivation to confirm the causal links between physical education and physical activity motivation.

7 PRIMARY FINDINGS AND CONCLUSIONS

The primary findings of the study can be summarized as follows:

1. This study found students' physical activity to decrease across Grades 6 to 9, individual differences diminishing across middle school. Although boys had constantly higher levels of physical activity, there were no gender differences in the developmental growth of physical activity.

2. The findings revealed that school students' expectancy-related beliefs toward physical education decreased, but that the valuing of physical education tasks was stable across Grades 6 to 9. The middle school transition, that is the transition from elementary school to middle school, moderated this development, accelerating the decrease in students' expectancy-related beliefs and temporarily increasing task values. However, various student subgroups were identified according to the development of their expectancy-related beliefs and task values toward physical education. Although boys had consistently higher expectancy beliefs across time, the developmental trend was similar between the genders. Furthermore, gender differences in students' physical education task values increased, boys valuing middle school physical education more than girls.

3. The Finnish school students were motivated toward physical education in both intrinsic and extrinsic ways, with high intrinsic and extrinsic motivation relating to high physical activity. In addition, boys had consistently higher levels of extrinsic motivation than girls, although girls and boys showed a similar pattern of increasing development of intrinsic and extrinsic motivation across Grades 6 to 9.

4. Finally, this study showed that different developmental patterns of students' expectancy-related beliefs and task values toward physical education were related to different physical activity. The most negative development of physical activity was found among the students with the lowest

levels and most negative decline in their physical education motivation. On the contrary, students' who valued physical education highly and grew to believe that they can succeed in school physical education became more physically active across the school years.

TIIVISTELMÄ

Koululaisten koululiikuntamotivaation ja fyysisen aktiivisuuden kehitys: 3.5 vuoden pitkittäistutkimus alakoulusta yläkouluun

Tämän tutkimuksen tarkoituksena oli analysoida koululaisten fyysisen aktiivisuuden ja koululiikuntamotivaation kehittymistä oppilaiden alakoulun 6. luokalta 9. luokalle tapahtuvan siirtymän aikana. Tutkimuksella oli neljä tavoitetta. Ensimmäisenä tehtävänä oli tutkia muutoksia koululaisten fyysisessä aktiivisuudessa sekä fyysisen aktiivisuuden kehittymiseen liittyviä sukupuolieroja. Toisena tavoitteena oli selvittää, miten oppilaiden koululiikuntaan liittyvät suoriutumisuskomukset ja koululiikunta-arvostukset kehittyvät tytöillä ja pojilla. Kolmanneksi tämä tutkimus analysoi sitä, miten koululaisten kokema itsemääräämismotivaatio, erityisesti sisäinen ja ulkoinen koululiikuntamotivaatio kehittyi kouluvuosien aikana, ja onko tässä kehittymisessä eroja tyttöjen ja poikien välillä. Neljänneksi selvitettiin oppilaiden fyysisen aktiivisuuden, suoritususkomusten, koululiikunta-arvostusten ja itsemääräämisen kehittymiseen liittyviä yhteyksiä.

Yhteensä 812 11–13-vuotiasta koululaista (382 tyttöä, 430 poikaa) 17 alakoulusta ja kahdeksasta yläkoulusta seurattiin 3,5 vuoden ja kuuden mittauskerran ajan. Latentti kasvukäyräanalyysi osoitti, että koululaisten fyysinen aktiivisuus laski koko yläkoulun ajan. Vaikka pojat olivat fyysisesti aktiivisempia kuin tytöt, fyysisen aktiivisuuden kehityksessä ei ollut sukupuolieroja. Toiseksi tulokset osoittivat, että oppilaiden liikuntatuntien kyvykkyyteen liittyvät suoritususkomukset laskivat, kun taas koululiikunta-arvostukset olivat verrattain stabiilit. Siirtymä alakoulusta yläkouluun kiihdytti oppilaiden suoritususkomusten laskua, kun taas koululiikunta-arvostukset kasvoivat väliaikaisesti siirtymän aikana. Vaikka poikien suoritususkomukset olivat korkeammat kuin tyttöjen uskomukset, suoritususkomusten kehittymisessä ei ollut eroa sukupuolten välillä. Kolmanneksi tulokset osoittivat, että koululaiset motivoituvat koululiikuntaan sekä sisäisesti että ulkoisesti. Pojat ovat tyttöjä ulkoisesti motivoituneempia, mutta niin tyttöjen kuin poikienkin sisäinen ja ulkoinen koululiikuntamotivaatio kasvoi lineaarisesti alakoulun 6. luokalta yläkoulun 9. luokalle asti. Lopuksi mixtureanalyysi osoitti, että oppilaat voidaan luokitella neljään eri alaryhmään perustuen heidän koululiikunnan suoritususkomusten ja arvostusten kehittymiseen. Negatiivisin kehittyminen fyysisessä aktiivisuudessa oli koululaisilla (6.4% oppilaista), joilla oli alhaisin suoritususkomusten ja koululiikunta-arvostusten taso sekä niiden negatiivisin kehitys. On kuitenkin merkille pantavaa, että 5% koululaisista tuli fyysisesti huomattavasti aktiivisemmaksi tutkimuksen aikana. Nämä oppilaat arvostivat koululiikuntaa ja heidän suoritususkomuksensa nousivat voimakkaasti erityisesti siirtymän aikana alakoulusta yläkouluun.

Tämän tutkimuksen perusteella voidaan todeta, että suuri osa oppilaista oli voimakkaasti motivoituneita koululiikuntaa kohtaan, mutta tästä huolimatta heidän fyysinen aktiivisuutensa laski yläkoulun aikana. Tutkimuksen perus-

teella voidaan olettaa, että koululiikunnan avulla on mahdollista vaikuttaa myönteisellä tavalla nuoren fyysiseen aktiivisuuteen, jos oppilaiden suoritususkomuksia pystytään tukemaan. Tämä näyttää olevan mahdollista ainakin silloin, jos oppilaat arvostavat koululiikuntaa.

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APPENDICES

Appendix A. Testing gender differences in growth trajectories

To test the gender differences in growth trajectories, that is, statistical testing of the Slopes of growth trajectories, the multiple-group (two-group) protocol by Muthén & Asparouhov (2002) was conducted. In two-group testing two hypothesized nested models (H_0 and H_1) can be tested by constraining subsequent parameters to be equal. If the p value associated with $\chi 2$ test is non-significant H_0 can be rejected and alternative hypothesis H_1 can be accepted.

Gender differences in the development of physical activity

In study IV, gender differences in students' physical activity growth trajectories were tested. First, the latent growth models of girls' and boys' physical activity were implemented in the same model. The model fitted data well: $\chi^2(15, n = 812) = 13.901$, $p = .533$, *CFI* = 1.00, *TLI* = 1.00, *RMSEA* < .001, 90%, CI [.00, .04]. Second, the variances of the latent Slope components were constrained to be equal. The new model fitted the data well: $\chi^2(16, n = 812) = 15.241$, $p = .507$, *CFI* = 1.00, *TLI* = 1.00, *RMSEA* < .001, 90%, CI [.00, .04]. Two-group test confirmed the gender similarity of the Slope variance: $\chi^2(1, n = 812) = 1.340$, $p = .247$. Third, the means of the latent Slope component were constrained to be equal. The new model fitted the data well: $\chi^2(17, n = 812) = 15.926$, $p = .529$, *CFI* = 1.00, *TLI* = 1.00, *RMSEA* < .001, 90%, CI [.00, .04]. Two-group test confirmed the gender similarity of the Slope means of physical activity variables: $\chi^2(1, n = 812) = .685$, $p = .408$. In sum, the statistical testing of gender differences in the development of students' physical activity revealed that although the genders differed in the level of physical activity, they were similar in their development of physical activity across Grades 7 to 9.

Gender differences in the development of expectancy-related beliefs and task values

To test gender differences in the growth trajectories of students' expectancy-related beliefs and task values toward physical education, latent growth curve analyses were implemented. Because preliminary examinations indicated students' growth to be non-linear across four time points, models were constructed by fixing only first two loadings of the growth component and last two parameters were allowed to estimate freely (Bollen & Curran, 2006). The fit of the girls' model of expectancy-related beliefs was adequate: $\chi^2(3, n = 382) = 9.563$, $p = .023$, *CFI* = .99, *TLI* = .98, *RMSEA* = .079, 90%, CI [.03, .14]. However, the modification indices indicated that the model could be improved by if the residual terms between the measurements at Time 3 and Time 5 were allowed to correlate. The fit of the reconstructed model was good: $\chi^2(2, n = 382) = 1.693$, $p = .429$, *CFI* = 1.00, *TLI* = 1.00, *RMSEA* < .001, 90%, CI [.00, .10]. The fit of the boys' model of expectancy-related beliefs was good: $\chi^2(3, n = 430) = 1.892$, $p = .595$, *CFI* = 1.00, *TLI* = 1.00, *RMSEA* < .001, 90%, CI [.00, .04]. The fit of the girls' model of task values was poor: $\chi^2(3, n = 382) = 21.458$, $p < .001$, *CFI* = .95, *TLI* = .91, *RMSEA*

= .132, 90%, *CI* [.08, .18]. However, the modification indices indicated that the model could be improved if the residual terms between the measurements at Time 0 and Time 1 were allowed to correlate. In addition, because the residual variance of the observed variable at Time 2 was negative, this construct was further fixed to be 0. The fit of the reconstructed final model was adequate: $\chi^2(3, n = 382) = 10.677$, $p = .014$, *CFI* = .98, *TLI* = .96, *RMSEA* = .085, 90%, CI [.03, .14]. However, calculation of *NFI* indicated that the fit of the final task value model of the girls was satisfactory (*NFI* = .973). Finally, the model s for boys' growth of task values toward physical education was constructed. The fit of the boys' model was adequate: $\chi^2(3, n = 430) = 10.402$, $p = .015$, CFI = .98, TLI = .95, *RMSEA* < .079, 90%, CI [.03, .13]. The modification indices indicated that the model could be improved by constraining the residual terms between the measurements at Time 0 and Time 1. The fit of the boys' final model was good: $\chi^2(2, n = 430) = .170$, $p = .919$, *CFI* = 1.00, *TLI* = 1.02, *RMSEA* < .001, 90%, CI [.00, .04]. The parameters of the final models are presented in Table 13.

TABLE 13 Estimation Results for the Final Unconditional Latent Growth Models for Expectancy-Related Beliefs and Task Values.

Estimates of Parameters	Expectancy-related Beliefs		Task values	
	Girls	Boys	Girls	Boys
Means				
Level (*f*1)	3.34(.04)	3.53(.04)	4.02 (.05)	4.07(.04)
Growth (*f*2)	-.29(.03)	-.29(.03)	-.02 (.01)	.16(.03)
Variances				
Level (ψ11)	.62(.16)	.80(.19)	.27 (.04)	.21(.11)
Change (ψ 22)	.72(.17)	.79(.19)	.01 (.01)ns	.36(.14)
Covariance (ψ21)	.98(.63)ns	.66(.59)ns	.01 (.01)ns	.20(.12)ns
Estimates values				
T3	.97(.10)	.86(.10)	-.09(1.08)ns	.34(.28)
T5	.96(.15)	.84(.12)	-.18(1.16)ns	.43(.27)
Error variances				
ε_1	1.08(1.16)ns	.78(.58)ns	.23 (.05)	.23(.12)ns
ε_2	.18(.03)	.28(.04)	.47(.07)	.47(.11)
ε_3	.19(.04)	.19(.02)	*0	.47(.08)
ε_4	.24(.04)	.15(.02)	.36 (.05)	.33(.04)
Fit of the model	$\chi2(2) = 1.693$ $p = .429$ *CFI* = 1.00 *TLI* = 1.00 *RMSEA* < .001 90%, CI [.00, .10]	$\chi2(3) = 1.892$ $p = .595$ *CFI* = 1.00 *TLI* = 1.00 *RMSEA* < .001 90%, CI [.00, .07]	$\chi2(3) = 10.677$ $p = .014$ *CFI* = .98 *TLI* = .96 *RMSEA* = .085 90%, CI [.03, .14]	$\chi2(2) = .170$ $p = .919$ *CFI* = 1.00 *TLI* = 1.02 *RMSEA* < .001 90%, CI [.00, .04]

Note 1. The unstandardized solutions. Standard errors are in parentheses.
Note 2. Ns = possible non-significance of estimated components.

Finally, gender differences in the growth trajectories of students' expectancy-related beliefs and task values were tested. First, the identified latent growth models of girls' and boys' expectancy-related beliefs were implemented in the

same model. The model fitted the data well: $\chi^2(4, n = 812) = 1.693$, $p = .791$, *CFI* = 1.00, *TLI* = 1.00, *RMSEA* < .001, 90%, CI [.00, .05]. Second, the variances of the latent Slope components were constrained to be equal. The new model fitted the data well: $\chi^2(5, n = 812) = 1.702$, $p = .889$, *CFI* = 1.00, *TLI* = 1.00, *RMSEA* = < .001, 90%, CI [.00, .03]. Two-group test confirmed the gender similarity of the Slope variances: $\chi^2(1, n = 812) = .009$, $p = .920$. Third, the means of the latent Slope components were constrained to be equal. The new model fitted the data well: $\chi^2(6, n = 812) = 1.721$, $p = .934$, *CFI* = 1.00, *TLI* = 1.01, *RMSEA* = < .001, 90%, CI [.00, .04]. Two-group test confirmed the gender similarities of the Slope means of expectancy-related beliefs variables: The $\chi^2(1, n = 812) = .094$, $p = .890$. In sum, the statistical testing of gender similarities in the development of students' expectancy-related beliefs toward physical education revealed that although the genders differed in the level of expectancy-related beliefs, they were similar in their development of expectancy-related belief.

The latent growth models of girls' and boys' task values were implemented in the same model. The model fitted the data adequately: $\chi^2(5, n = 812) = 26.383$, $p < .001$, *CFI* = .97, *TLI* = .95, *RMSEA* = .107, 90%, CI [.07, .15], *NFI* = .962. Second, the variances of the latent Slope components were constrained to be equal. The new model fitted the data adequately: $\chi^2(6, n = 812) = 26.062$, $p < .001$, *CFI* = .97, *TLI* = .95, *RMSEA* = .095, 90%, CI [.06, .13], *NFI* = .962. However, the two-group test confirmed the gender differences in the Slope variances: $\chi^2(1, n = 812) = .009$, $p = .920$. Finally, the means of the latent Slope components of the original model were constrained to be equal. The new model fitted the data adequately: $\chi^2(6, n = 812) = 27.055$, $p < .001$, *CFI* = .97, *TLI* = .94, *RMSEA* = .097, 90%, *CI* [.06, .14], *NFI* = .962. Two-group test confirmed the gender differences of the Slope means of task value variables: The $\chi^2(1, n = 812) = .993$, $p = .319$. In sum, the statistical testing of gender differences in the development of students' task values toward physical education revealed that the genders had different growth trajectories across Grades 6 to 9.

Gender differences in the cross-lagged development of task values toward physical education and physical activity

In Study III, the differences in the parallel development of students' task values toward physical education and physical activity was tested. To test gender differences in the cross-lagged relationship of these components, previous model were preserved for two-group tests. The model fitted the data well: $\chi^2(18, n = 812) = 27.841$, $p = .065$, *CFI* = 1.00, *TLI* = .99, *RMSEA* = .041, 90%, CI [.00, .06]. Second, to test gender similarity in the development of students' physical education task values and physical activity, the path coefficients of the latent physical education task values and physical activity components were constrained to be equal across gender, and the fit of the consequent model was tested with the chi-square difference test. This constrained model fitted the data well: $\chi^2(21, n = 812) = 31.162$, $p = .071$, *CFI* = 1.00, *TLI* = .99, *RMSEA* = .039, 90%, CI [.00, .06]. The result of the two-group test indicated that girls' and boys' paths were similar $\chi^2(3, n = 812) = 3.319$, p = .345. Taken together, despite of the mean level dif-

ferences in the observed variables, these results showed gender similarity in the parallel development of students' physical education task values and physical activity.

Gender differences in the development of motivational regulations
The gender differences in students' growth trajectories of motivational regulations were tested in series of chi-square tests.

Intrinsic motivation
First, the latent growth models of girls' and boys' intrinsic motivation were implemented in the same model. The model fitted data adequately: $\chi^2(22, n = 812) = 44.351$, $p = .003$, *CFI* = .97, *TLI* = .95, *RMSEA* = .051, 90%, CI [.03, .07], *NFI* = 96.44. Second, the variances of the latent Slope components were constrained to be equal. The new model fitted the data adequately: $\chi^2(23, n = 812) = 43.351$, $p = .006$, *CFI* = .97, *TLI* = .96, *RMSEA* = .048, 90%, CI [.03, .07], *NFI* = 96.32. The two-group test revealed the gender similarity of the Slope variance: $\chi^2(1, n = 812) = .619$, $p = .431$. Third, the means of the latent Slope component were constrained to be equal. The new model fitted the data well: $\chi^2(24, n = 812) = 44.466$, $p = .006$, *CFI* = .97, *TLI* = .96, *RMSEA* = .047, 90%, CI [.03, .07]. The two-group test confirmed the gender similarity of the Slope means of students' intrinsic motivation: $\chi^2(1, n = 812) = .115$, $p = .734$. In sum, the statistical testing of gender similarities in the development of students' intrinsic motivation revealed that girls and boys were similar in their development of intrinsic motivation.

Identified regulation
Next, the gender differences in the development of students' identified regulation were tested. The latent growth models of girls' and boys' identified regulation was implemented in the same model. The model fitted the data adequately: $\chi^2(26, n = 812) = 46.913$, $p = .007$, *CFI* = .97, *TLI* = .95, *RMSEA* = .051, 90%, CI [.03, .07], *NFI* = 95.81. Second, the variances of the latent Slope components were constrained to be equal. The new model fitted the data adequately: $\chi^2(27, n = 812) = 48.448$, $p = .001$, *CFI* = .97, *TLI* = .96, *RMSEA* = .046, 90%, CI [.02, .07], *NFI* = 95.73. The two-group test revealed that the genders were similar in the Slope variance: $\chi^2(1, n = 812) = 1.971$, $p = .160$. Third, the means of the latent Slope component were constrained to be equal. The new model fitted the data adequately: $\chi^2(28, n = 812) = 49.359$, $p = .001$, *CFI* = .97, *TLI* = .96, *RMSEA* = .045, 90%, CI [.02, .07], *NFI* = 95.60. The two-group test confirmed the gender similarity of the Slope means of students' identified regulation: $\chi^2(1, n = 812) = .475$, $p = .491$. In sum, the statistical testing of gender similarities in the development of students' identified regulation revealed that girls and boys did not differ in their development of intrinsic motivation.

Introjected regulation
First, the latent growth models of girls' and boys' introjected regulation were implemented in the same model. The model fitted the data adequately: $\chi^2(24, n = 812) = 38.342$, $p = .032$, *CFI* = .96, *TLI* = .94, *RMSEA* = .061, 90%, CI [.04, .09],

NFI = 95.22. Second, the variances of the latent Slope components were constrained to be equal. The new model fitted the data adequately: $\chi^2(25, n = 812) = 43.351, p = .006$, *CFI* = .96, *TLI* = .95, *RMSEA* = .072, 90%, CI [.05, .09], *NFI* = 95.19. The two-group test revealed the gender differences in the Slope variance: $\chi^2(1, n = 812) = 44.291, p < .001$. Third, instead of the constrained variance components, the means of the latent Slope component were constrained to be equal. The new model fitted the data adequately: $\chi^2(25, n = 812) = 45.366, p = .001$, *CFI* = .97, *TLI* = .96, *RMSEA* = .047, 90%, CI [.03, .07], *NFI* = 95.14. The two-group test confirmed the gender difference of the Slope means of students' introjected regulation: $\chi^2(1, n = 812) = 7.024, p < .001$. In sum, the statistical testing of gender differences in the development of students' introjected regulation revealed that girls and boys were different in their development of introjected regulation.

Extrinsic motivation

First, the latent growth models of girls' and boys' extrinsic motivation were implemented in the same model. The model fitted the data well: $\chi^2(26, n = 812) = 49.056, p = .004$, *CFI* = .98, *TLI* = .98, *RMSEA* = .048, 90%, CI [.03, .07]. Second, the variances of the latent Slope components were constrained to be equal. The new model fitted the data adequately: $\chi^2(27, n = 812) = 54.101, p = .006$, *CFI* = .98, *TLI* = .97, *RMSEA* = .051, 90%, CI [.03, .07], *NFI* = 96.11. The wo-group test revealed the gender similarity of the Slope variance: $\chi^2(1, n = 812) = 5.045, p < .002$. Third, the means of the latent Slope component were constrained to be equal. The new model fitted the data adequately: $\chi^2(28, n = 812) = 57.963, p < .001$, *CFI* = .97, *TLI* = .96, *RMSEA* = .053, 90%, CI [.03, .07]. The two-group test confirmed the gender similarity of the Slope means of students' extrinsic motivation: $\chi^2(1, n = 812) = 8.907, p < .001$. In sum, the statistical testing of gender similarities in the development of students' intrinsic motivation revealed that although boys had higher extrinsic motivation than girls, they were similar in their development of extrinsic motivation.

Amotivation

First, the latent growth models of girls' and boys' amotivation were implemented in the same model. The model fitted the data adequately: $\chi^2(25, n = 812) = 61.462, p < .001$, *CFI* = .96, *TLI* = .95, *RMSEA* = .062, 90%, CI [.04, .08], *NFI* = .96.02. Second, the variances of the latent Slope 1 components, that is, the statistically significant part of the piece-wise growth trajectory, were constrained to be equal. The new model fitted the data adequately: $\chi^2(26, n = 812) = 62.694, p< .001$, *CFI* = .96, *TLI* = .96, *RMSEA* = .061, 90%, CI [.04, .08], *NFI* = 95.82. The two-group test revealed that girls and boys are similar in the variances of the Slope components: $\chi^2(1, n = 812) = 1.232, p = .267$. Third, the means of the latent Slope component were constrained to be equal. The new model fitted the data well: $\chi^2(27, n = 812) = 63.004, p < .001$, *CFI* = .96, *TLI* = .96, *RMSEA* = .059, 90%, CI [.04, .08], *NFI* = 95.76. The two-group test confirmed the gender similarity of the Slope means of students' amotivation: $\chi^2(1, n = 812) = .310, p = .578$. In sum, the statistical testing of gender differences in the development of students' amo-

tivation, that is lack of motivation, toward physical education revealed that girls and boys were similar in their development of amotivation.

Appendix B. Instrumentation in Finnish

Finnish Version of the Physical Activity Scale

Seuraavassa kysymyksessä liikunnalla tarkoitetaan kaikkea sellaista toimintaa, joka nostaa sydämen lyöntitiheyttä ja saa sinut hetkeksi hengästymään esimerkiksi urheillessa, ystävien kanssa pelatessa, koulumatkalla tai koulun liikuntatunneilla. Liikuntaa on esimerkiksi juokseminen, ripeä kävely, rullaluistelu, pyöräily, tanssiminen, rullalautailu, uinti, laskettelu, hiihto, jalkapallo, koripallo ja pesäpallo.

Mieti tyypillistä viikkoasi. Merkitse kuinka monena päivänä olet liikkunut *vähintään 60 minuuttia* päivässä?

☐☐☐☐☐☐☐☐

0 1 2 3 4 5 6 7
päivänä päivänä

Mieti edellistä 7 päivää. Merkitse kuinka monena päivänä olet liikkunut *vähintään 60 minuuttia* päivässä?

☐☐☐☐☐☐☐☐

0 1 2 3 4 5 6 7
päivänä päivänä

Finnish Version of the Self-Perception Questionnaire

Kuinka *hyvä* olet seuraavissa oppiaineissa?

	1 = Olen huono… 5 = Olen hyvä				
1. Äidinkieli	1	2	3	4	5
2. Englanti	1	2	3	4	5
3. Ruotsi	1	2	3	4	5
4. Matematiikka	1	2	3	4	5
5. Biologia ja maantieto	1	2	3	4	5
6. Fysiikka ja kemia	1	2	3	4	5
7. Uskonto/elämänkatsomustieto	1	2	3	4	5
8. Historia	1	2	3	4	5
9. Musiikki	1	2	3	4	5
10. Kuvaamataito	1	2	3	4	5
11. Liikunta	1	2	3	4	5
12. Käsityö	1	2	3	4	5

Kuinka *hyvä* olet seuraavissa oppiaineissa *suhteessa* muihin oppilaisiin?

	1 = Olen huono… 5 = Olen hyvä				
1. Äidinkieli	1	2	3	4	5
2. Englanti	1	2	3	4	5
3. Ruotsi	1	2	3	4	5
4. Matematiikka	1	2	3	4	5
5. Biologia ja maantieto	1	2	3	4	5
6. Fysiikka ja kemia	1	2	3	4	5
7. Uskonto/elämänkatsomustieto	1	2	3	4	5
8. Historia	1	2	3	4	5
9. Musiikki	1	2	3	4	5
10. Kuvaamataito	1	2	3	4	5
11. Liikunta	1	2	3	4	5
12. Käsityö	1	2	3	4	5

Kuinka *hyvin* opit uusia asioita kun vertaat itseäsi muihin oppilaisiin?

	1 = Paljon huonommin kuin muut… 5 = Paljon paremmin kuin muut				
1. Äidinkieli	1	2	3	4	5
2. Englanti	1	2	3	4	5
3. Ruotsi	1	2	3	4	5
4. Matematiikka	1	2	3	4	5
5. Biologia ja maantieto	1	2	3	4	5
6. Fysiikka ja kemia	1	2	3	4	5
7. Uskonto/elämänkatsomustieto	1	2	3	4	5
8. Historia	1	2	3	4	5
9. Musiikki	1	2	3	4	5
10. Kuvaamataito	1	2	3	4	5
11. Liikunta	1	2	3	4	5
12. Käsityö	1	2	3	4	5

Finnish Version of the Task Values Scale

Kuinka *tärkeinä/hyödyllisinä/kiinnostavina* pidät henkilökohtaisesti seuraavia oppiaineita tai oppiainekokonaisuuksia?

Ympyröi alla olevista väittämistä sinulle sopivin vaihtoehto, joka kuvaa käsityksiäsi eri kouluaineista. Vastaa kysymyksiin asteikolla 1 – 5 niin, että 1 = täysin eri mieltä, 2 = jokseenkin eri mieltä, 3 = ei samaa eikä eri mieltä, 4 = jokseenkin samaa mieltä, 5 = täysin samaa mieltä.

KÄSITYKSENI SEURAAVISTA OPPIAINEISTA	TÄRKEYS	HYÖDYLLISYYS	KIINNOSTAVUUS
1. Äidinkieli	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
2. Englanti	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
3. Ruotsi	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
4. Matematiikka	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
5. Biologia ja maantieto	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
6. Fysiikka ja kemia	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
7. Uskonto/elämänkatsomustieto	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
8. Historia	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
9. Musiikki	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
10. Kuvaamataito	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
11. Liikunta	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
12. Käsityö	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Kuinka *tärkeinä/hyödyllisinä/kiinnostavina* pidät seuraavia oppiaineita tai oppiainekokonaisuuksia *tulevaisuutesi* kannalta?

KÄSITYKSENI SEURAAVISTA OPPIAINEISTA	TÄRKEYS	HYÖDYLLISYYS	KIINNOSTAVUUS
1. Äidinkieli	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
2. Englanti	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
3. Ruotsi	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
4. Matematiikka	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
5. Biologia ja maantieto	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
6. Fysiikka ja kemia	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
7. Uskonto/elämänkatsomustieto	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
8. Historia	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
9. Musiikki	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
10. Kuvaamataito	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
11. Liikunta	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
12. Käsityö	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Finnish version of the Physical Education Motivation Scale
Ympyröi seuraavista väittämistä yksi vaihtoehto, joka parhaiten vastaa *sinun* käsitystäsi:

Syy miksi osallistun koululiikuntaan**...**

1=Täysin eri mieltä… 5= Täysin samaa mieltä

1. Mielihyvän takia, jota saan jännittävistä kokemuksista.	1 2 3 4 5
2. Mielihyvän takia, jota tunnen kun opin uusia asioita.	1 2 3 4 5
3. Minulla oli aikaisemmin hyviä syitä liikkua, mutta nyt mietin onko tässä enää ”järkeä”.	1 2 3 4 5
4. Mielihyvästä, jota tunnen kun löydän uusia harjoittelutapoja	1 2 3 4 5
5. Minulla on käsitys etten pysty menestymään liikunnassa	1 2 3 4 5
6. Koska se saa minulle tutut ihmiset arvostamaan minua	1 2 3 4 5
7. Koska mielestäni se on yksi parhaista tavoista tavata ihmisiä	1 2 3 4 5
8. Koska olen tyytyväinen, kun opin jonkin vaikean harjoittelutekniikan	1 2 3 4 5
9. Koska on todella tarpeellista harrastaa liikuntaa, jos haluaa pysyä kunnossa.	1 2 3 4 5
10. Etuoikeudesta olla urheilija	1 2 3 4 5
11. Koska se on yksi parhaista valitsemistani tavoista kehittää elämäni muita osa-alueita	1 2 3 4 5
12. Mielihyvästä jota saan kun parannan heikkoja kohtiani	1 2 3 4 5
13. Jännityksestä jota tunnen kun osallistun toimintaan	1 2 3 4 5
14. Koska minun täytyy harrastaa liikuntaa, että voin olla tyytyväinen itseeni.	1 2 3 4 5
15. Tyytyväisyydestä jota koen kun parannan kykyjäni	1 2 3 4 5
16. Koska minulle läheiset ihmiset ajattelevat, että on tärkeää pysyä kunnossa	1 2 3 4 5
17. Koska se on hyvä tapa oppia paljon asioita, jotka voivat olla hyödyllisiä elämän muillakin alueilla	1 2 3 4 5
18. Voimakkaiden tunteiden takia, joita tunnen kun harrastan jotain mistä pidän	1 2 3 4 5
19. Se ei ole minulle enää selvää. En tunne että paikkani on liikuntatunnilla.	1 2 3 4 5
20. Mielihyvästä, jota tunnen vaikean tehtävän suorittamisen jälkeen	1 2 3 4 5
21. Koska tuntuisi pahalta jos minulla ei olisi enää aikaa tehdä sitä.	1 2 3 4 5
22. Näyttääkseni muille kuinka hyvä olen liikunnassa	1 2 3 4 5

23. Mielihyvästä, jota tunnen kun opin tekniikan jota en ole aikaisemmin yrittänyt. 1 2 3 4 5
24. Koska se on yksi parhaista tavoista pitää suhteita yllä ystävieni kanssa. 1 2 3 4 5
25. Koska pidän tunteesta olla täysin syventynyt toimintaan. ..1 2 3 4 5
26. Koska minun täytyy harrastaa liikuntaa säännöllisesti. 1 2 3 4 5
27. Mielihyvän tunteesta jota uusien suoritusmenetelmien löytäminen aikaansaa. 1 2 3 4 5
28. Mietin usein itsekseni: En pysty saavuttamaan itselleni asettamiani tavoitteita. 1 2 3 4 5

Appendix C. Instrumentation in English

Physical Activity Scale
In the next two questions physical activity means all activities which raise your heart rate or momentarily get you out of breath, for example, in doing exercise, playing with your friends, going to school, or in school physical education. Sport also includes, for example, jogging, intensive walking, roller skating, cycling, dancing, skating, skiing, soccer, basketball, and baseball.

When you think about your typical week, on how many days are you physically active for a total of *at least 60 minutes* per day?

□□□□□□□□

0 1 2 3 4 5 6 7
days days

Over the past 7 days, on how many days were you physically active for a total of *at least 60 minutes* per day?

□□□□□□□□

0 1 2 3 4 5 6 7
days days

Self-Perception Questionnaire

How good are you at physical education?

	1 = *very bad*… 5 = *very good*				
1. Finnish language	1	2	3	4	5
2. English language	1	2	3	4	5
3. Swedish	1	2	3	4	5
4. Mathematics	1	2	3	4	5
5. Biology and Geography	1	2	3	4	5
6. Physics and Chemistry	1	2	3	4	5
7. Religion	1	2	3	4	5
8. History	1	2	3	4	5
9. Music	1	2	3	4	5
10. Arts	1	2	3	4	5
11. Physical Education	1	2	3	4	5
12. Crafts	1	2	3	4	5

Compared to other students, how good at physical education are you?

	1 = one of the worst… 5 = one of the best				
1. Finnish language	1	2	3	4	5
2. English language	1	2	3	4	5
3. Swedish	1	2	3	4	5
4. Mathematics	1	2	3	4	5
5. Biology and Geography	1	2	3	4	5
6. Physics and Chemistry	1	2	3	4	5
7. Religion	1	2	3	4	5
8. History	1	2	3	4	5
9. Music	1	2	3	4	5
10. Arts	1	2	3	4	5
11. Physical Education	1	2	3	4	5
12. Crafts	1	2	3	4	5

How good would you be at learning something new in physical education this year?

	1 = very bad… 5 = very good				
1. Finnish language	1	2	3	4	5
2. English language	1	2	3	4	5
3. Swedish	1	2	3	4	5
4. Mathematics	1	2	3	4	5
5. Biology and Geography	1	2	3	4	5
6. Physics and Chemistry	1	2	3	4	5
7. Religion	1	2	3	4	5
8. History	1	2	3	4	5
9. Music	1	2	3	4	5
10. Arts	1	2	3	4	5
11. Physical Education	1	2	3	4	5
12. Crafts	1	2	3	4	5

Task Values Scale

Read each item carefully. Using the scale below, please circle the number that best describes your values concerning various school subjects. Please use following scale: 1 = strongly disagree, 2 = somehow disagree, 3 = not disagree nor agree, 4 = somehow agree, 5 = strongly agree.

How *important/useful/interesting* you find following subjects?

MY PERCEPTIONS OF THE FOLLOWING SUBJECTS	IMPORTANT	USEFULNESS	INTEREST
1. Finnish language	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
2. English language	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
3. Swedish language	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
4. Mathematics	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
5. Biology and Geography	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
6. Physics and Chemistry	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
7. Religion	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
8. History	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
9. Music	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
10. Arts	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
11. Physical Education	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
12. Crafts	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

How *important/useful/interesting* you find following subjects for *your future*?

MY PERCEPTIONS OF FOLLOWING SUBJECTS	IMPORTANT	USEFULNESS	INTEREST
1. Finnish language	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
2. English language	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
3. Swedish language	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
4. Mathematics	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
5. Biology and Geography	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
6. Physics and Chemistry	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
7. Religion	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
8. History	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
9. Music	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
10. Arts	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
11. Physical Education	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
12. Crafts	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

The Finnish version of the Physical Education Motivation Scale
Using the scale below, please circle the number that best describes your values concerning various school subjects.

Why am I currently participating in physical education?

1=Strongly disagree… 5= Strongly agree

1. For the pleasure I feel in living exciting experiences. 1 2 3 4 5
2. For the pleasure it gives me to know more about the sport skills that I practice. 1 2 3 4 5
3. I used to have good reasons for participating in PE, but now I am asking myself if I should continue doing it. 1 2 3 4 5
4. For the pleasure of discovering new training techniques.....1 2 3 4 5
5. I don't know anymore; I have the impression that I'm incapable of succeeding in PE.....1 2 3 4 5
6. Because it allows me to be well regarded by people that I know.....1 2 3 4 5
7. Because, in my opinion, it is one of the best ways to get acquainted with others.....1 2 3 4 5
8. Because I feel a lot of personal satisfaction while mastering certain difficult training technique.....1 2 3 4 5
9. Because it is absolutely necessary to do sports if one wants to be in shape.....1 2 3 4 5
10. For the prestige of being an athlete.....1 2 3 4 5
11. Because it is one of the best ways I have chosen to develop other aspects of myself. 1 2 3 4 5
12. For the pleasure I feel when I improve some of my weak points.....1 2 3 4 5
13. For the excitement I feel when I'm really involved in the activity 1 2 3 4 5
14. Because I must do sports to feel good about myself. 1 2 3 4 5
15. For the satisfaction I experience when I am perfecting my abilities.....1 2 3 4 5
16. Because people around me think it is important to be in shape 1 2 3 4 5
17. Because it is a good way to learn lots of things which could be useful to me in other areas of my life 1 2 3 4 5
18. For the intense emotions that I feel when I am doing sports that I like 1 2 3 4 5
19. It is not clear to me anymore; I don't really think my place is in PE.....1 2 3 4 5
20. For the pleasure that I feel when executing certain difficult movements 1 2 3 4 5
21. Because I would feel bad if I was not taking time to do it.....1 2 3 4 5

22. To show others how good I am at sport.....1 2 3 4 5
23. For the pleasure that I feel when learning skills
that I have never tried before. 1 2 3 4 5
24. Because it is one of the best ways to maintain
good relationships with my school friends.....1 2 3 4 5
25. I like the feeling of being totally immersed in the activity. ..1 2 3 4 5
26. Because I must do sports regularly. 1 2 3 4 5
27. For the pleasure of discovering new performance
strategies. 1 2 3 4 5
28. I often ask myself; I can't seem to achieve the
goals that I set for myself.....1 2 3 4 5

Appendix D. Parental consent in Finnish

Lapsenne osallistuminen koululiikuntatutkimukseen,
Jyväskylän kouluissa toteutetaan Jyväskylän yliopiston toimesta *Koululiikunta* – tutkimus vuosien 2006 -2009 aikana. *Koululaisten odotusarvot, liikuntamotivaatio ja fyysinen aktiivisuus – seurantatutkimus alakoulusta yläkouluun* -tutkimuksessa selvitetään mm. lasten liikunta-aktiivisuuden ja liikuntamotivaation muuttumista 6 luokalta 9 luokalle. Tutkimus toteutetaan kyselymenetelmällä ja se tapahtuu koulutiloissa koulutunnilla. Ensimmäinen oppilaskysely toteutetaan huhtikuussa 2007 ja tutkittavina ovat kaikki XXXX kaupungin kuudennella luokalla olevat lapset.

Lapsenne osallistuminen tutkimukseen on täysin vapaaehtoista. Tutkittavilla on tutkimuksen aikana oikeus kieltäytyä mittauksista ja keskeyttää tutkimus. Tutkimuksen järjestelyt ja tulosten raportointi on luottamuksellista ja tutkimuksesta saatavat tiedot tulevat ainoastaan tutkittavan ja tutkijaryhmän käyttöön eikä yksittäistä lasta voi tutkimuksesta tunnistaa

Tämän tutkimuksen tarkoituksena on selvittää millainen on jyväskyläläisten koululaisten liikuntamotivaatio ja fyysinen aktiivisuus ja miten he viihtyvät koulun liikuntatunneilla. Tutkimuksen aikana peilataan niitä muutoksia, joita oppilaissa tapahtuu kriittisten murrosvaiheen aikana sekä pyritään löytämään niitä tekijöitä, jotka vaikuttavat inaktiivisen elämäntavan syntyyn. Tutkimuksesta saadun tiedon perusteella pystytään paremmin tukemaan koululiikunnan tavoitteita elinikäisen liikuntainnostuksen motivoimiseksi.

Tutkimustuloksia tullaan käyttämään koulun ja opetuksen kehittämiseen.

Kysymme Teiltä tällä lomakkeella lupaa lapsenne osallistumiseen tutkimukseen. Pyydämme Teitä ystävällisesti täyttämään alla olevat kohdat ja palauttamaan lomakkeen opettajalle oheisessa palautuskuoressa viimeistään **10.4.2007**.

Lapsen nimi (6. luokalla) : _____

Tutkimukseen osallistuminen

Kyllä ☐ Lapsi voi osallistua tutkimukseen.

Ei ☐ Lapsi ei voi osallistua tutkimukseen.

_____

Päiväys ja huoltajan allekirjoitus (äiti/vastaava huoltaja):_____

Puh. nro: _____

S-posti: _____

TAI

Päiväys ja huoltajan allekirjoitus (isä/vastaava huoltaja):_____

Puh.nro: _____

S-posti: _____

Arvostamme suuresti vaivannäköänne yhteisessä yrityksessämme tukea lasten liikuntaharrastuneisuutta.

Yhteystiedot. Vastaamme mielellämme tiedusteluihin ja annamme lisätietoja.

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