

The Role of Gender, Enjoyment, Perceived Competence, and Fundamental Movement Skills as Correlates of the Physical Activity Engagement of Finnish Physical Education Students

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Abstract

The aim of the study was to investigate the relationships between enjoyment, perceived competence, fundamental movement skills, and physical activity engagement of Grade 7 students participating in Finnish physical education. A secondary aim of the study was to examine gender differences in all assessed variables. The participants of the study were 404 Grade 7 students aged 13 years. The sample comprised 210 girls and 194 boys, who were involved in 23 classes taught by 10 physical education teachers at three secondary schools. Physical activity engagement, enjoyment, and perceived physical activity competence were assessed by self-report questionnaires. Locomotor skill were evaluated by the shuttle running test, balance skill by the flamingo standing test, and manipulative skills by the figure-8 dribbling test. Results of a stepwise regression analysis revealed that only perceived physical activity competence was a statistically significant predictor of physical activity engagement. The t-tests revealed that the girls scored better in the balance test, whereas the boys scored better in the shuttle running test. Additionally, the boys perceived higher levels of physical activity competence than the girls.

Key words: physical activity, enjoyment, perceived competence, fundamental movement skills

Background

The links between physical activity and health are clearly shown in many studies (Bouchard, Blair, and Haskell 2007; Malina, Bouchard, and Bar-Or 2004). Although we recognize the fact of the association between physical activity and health, the majority of individuals in many developed populations are not sufficiently active. Many researchers including Andersen *et al.* (2006), Biddle, Sallis, and Cavill (1998) and Strong *et al.* (2005) have detailed recommendations that children should participate in moderate physical activity at least 60 minutes per day. In Finland, young people are also demonstrating higher levels of exercise passivity with Samdal *et al.* (2007) reporting that for a large sample of adolescents only 43 per cent of girls and 56 per cent of boys engaged in vigorous physical activity at least four times a week. Studies have indicated that childhood and adolescence are important periods for adopting physically active lifestyle later in adulthood (Malina 2001; Telama *et al.* 1997). Research has also shown that physical activity levels decline markedly after the age of 12 in both frequency of physical activity engagement and actual participation time in sport (Telama and Yang 2000). We can then argue that the transition period from elementary school to secondary school is an important time for the development of later activity patterns. Review of the research regarding physical activity and the variables that affect participation highlights that very few studies have investigated factors such as motor skill proficiency and exercise motivation involving secondary school samples (e.g., Okely, Booth, and Patterson 2001). Most studies of childhood physical activity engagement have been conducted using pre and elementary school aged students (e.g., Fisher *et al.* 2005; Sääkslahti *et al.* 1999; Wrotniak *et al.* 2006). There is a need, therefore, to study physical activity and the associated motivational and motor skill antecedents at the secondary school level.

The concept of enjoyment has been defined as a multidimensional construct consisting of factors associated with excitement, affect, competence, attitude, and cognition (Crocker, Bouffard, and Gessaroli 1995; Wankel 1997). According to Scanlan and Simons (1992) enjoyment is an important factor in participation in sport that may lead to greater involvement in the activity. Research has also shown that enjoyment is an antecedent of physical activity. Rowland and Freedson (1994) stated that providing enjoyable experiences is a potential strategy for increasing physical activity levels in youth. Wallhead and Buckworth (2004)

found that enjoyment in school physical education was related to the motivational factors associated with the adoption of a physically active lifestyle outside school hours. Additionally, enjoyment has been linked with physical activity engagement in physical education (Kremer, Trew, and Ogle 1997; Wallhead and Buckworth 2004).

Perceived physical competence reflects the perception a person has of their abilities resulting from cumulative interactions with the environment (Harter 1978). According to Fox (1997) perceived competence can be seen as “the statement of personal ability that generalises across a domain such as sport, scholarship, or work” (Fox 1997, p. xii.). According to Harter’s (1978) competence motivation theory, highly competent individuals will persist longer in certain activities compared with individuals of low perceived competence. Harter (1978) assumed that in achievement situations individuals seek activities that provide feelings of competence and avoid those with a probability of failure. Sonstroem (1978) suggested that perception of physical competence leads to more positive attitudes toward physical activity. These attitudes affect voluntary involvement in activity. Studies have also indicated that perceived physical competence have been positively associated with engagement in physical activity (Bagoien and Halvari 2005; Carroll and Loumidis 2001) and motor skill abilities (Ebbeck and Becker 1994; Sonstroem, Harlow and Salisbury, 1993). Additionally, Sallis, Prochaska, and Taylor (2000) in their review of correlates of physical activity of children and adolescents concluded that perceived competence was a critical element related to engagement in physical activity.

Fundamental movement skills include balance, manipulative and locomotor skills. Balance refers to both the body remaining in place but moving around its horizontal or vertical axis (Gallahue and Donnelly 2003) and the process for maintaining postural stability (Wescott, Lowes, and Richardson 1997). More specifically, Wescott *et al.* defined static balance as the “ability to maintain a posture, such as balancing in a standing or sitting position”; and dynamic balance as the “ability to maintain postural control during other movements, such as when reaching for an object or walking across a lawn” (p. 630). According to Gallahue and Donnelly (2003), axial movements such as bending, stretching, twisting, turning, swinging, body inversion, body rolling and landing/stopping are all considered to be balance skills. Manipulative movement skills include either gross motor or fine motor movements. Gross motor manipulation involves movements that give force to objects or receive force from objects.

Throwing, catching, kicking, trapping, striking, volleying, bouncing, ball rolling and punting are considered to be fundamental gross motor manipulative skills. The term fine motor manipulation refers to object-handling activities that emphasize motor control, precision and accuracy of movement. Locomotor skills refer to the body being transported in a horizontal or vertical direction from one point to another. Activities, such as walking, running, jumping, hopping, skipping, galloping, sliding, leaping and climbing are considered to represent locomotor movement skills (Gallahue and Donnelly 2003).

Gender differences have been reported for each of the three areas of fundamental movement skills. Boys have been found to perform better in manipulative movement skills (Castelli and Valley 2007; Junaid and Fellowes 2006; Okely *et al.* 2001). Okely *et al.* (2001) studied a sample of 2,026 boys and girls, aged 13 and 15 years, who completed fundamental movement tasks involving throwing and catching skills, and reported boys having significantly higher scores for both tasks at each age level. Gender differences have been found to be less consistent when evaluating children's balance skills. Fjortoft (2000) and Sääkslahti (2005) found that 3- to 6-year-old girls are better than boys of the same ages in balance skills. This finding was also supported in the Toole and Kretzschmar's (1993) meta-analysis. Junaid and Fellowes (2006), however, found no gender differences in balance skills for children aged seven and eight. Wiczorek and Adrian (2006) detailed the Eurofit balance test scores for 615 Polish 11- to 15-year-olds and highlighted variations across age groups which suggested as children mature physically, gender differences in relation to balance are smaller. Existing evidence indicates that 12- and 14-year-old boys are better in locomotor skills, such as leaping and running, possibly due to the higher strength level of the boys (Nupponen and Telama 1998). Overall, the findings concerning gender differences in movement skills are interesting because they may be related to the reported higher levels of physical activity of boys (e.g., Aarnio *et al.* 2002; Castelli and Valley 2007; Riddoch *et al.* 2004). These types of trends, however, may be an outcome of the strong association between higher levels of engagement in physical activity and participation in sport clubs. Eiosdottir *et al.* (2008) reported that for a sample of Icelandic adolescents, boys were substantially higher than girls in both reported vigorous physical activity and sport club participation. Physical education sociologists have noted that that sport club membership is often a result of the male oriented dominance of many sporting cultures

(Flintoff 2008), which may lead to reduced opportunities for girls to be involved in sport and physical activity and as a consequence operate as a limiting factor in the development of their fundamental movement skills. Finally, gender differences have been found in perceived competence and enjoyment that indicate boys perceive themselves as more competent and report higher levels of enjoyment in physical activity (Biddle *et al.* 1993; Carroll and Loumidis 2001; Soini 2006).

As yet only a limited number of studies have investigated the effect of motor skill capabilities on physical activity engagement within samples involving children and adolescents. Okely *et al.* (2001) found that fundamental movement skill levels significantly predicted time in organized physical activity within a sample of 13-15 years-old Australian students. Fisher *et al.* (2005) reported moderate associations between the movement skill capabilities and physical activity participation of 4-year-old Scottish children. Additionally, Wrotniak *et al.* (2006) determined that motor proficiency was positively associated with physical activity and inversely associated with sedentary activity in a sample of students aged 8 to 10 years.

Although only limited information exists on the relationship between motor skills and physical activity engagement, we may assume that the mastery of fundamental motor skills is a critical element of effective participation in physical activity. Satisfactory levels of motor skill competence demonstrated in childhood and adolescence may be predictive of later physical activity engagement (Sallis *et al.* 2000). Overall, youth with more developed motor proficiencies may find it easier to be physically active and may be more likely to engage in a wider variety of sport and exercise activities compared with their peers who demonstrate lower levels of motor skill competence (Haywood and Getchell 2005). Alternatively, Vallerand and Losier (1999) consider that motivation leads to consequences associated with cognitive, affective, and behavioural outcomes, and on this basis, the motivation to be physically active could also be considered a causal factor in the development of fundamental movement skills. Furthermore, young people who demonstrate higher levels of perceived physical activity competence and enjoyment in physical education may also maintain efficacious engagement in physical activity.

The aim of the study was to investigate the relationships between enjoyment, perceived physical activity competence, fundamental movement skills, and physical activity engagement of Grade 7 students participating in Finnish physical education. It was hypothesized that enjoyment, per-

ceived physical activity competence, and fundamental movement skills are related to participation levels in physical activity. A secondary aim of the study was to examine gender differences in all assessed variables.

Methods

Participants

The participants of the study were 404 Finnish Grade 7 students aged 13 years. The sample comprised 210 girls and 194 boys, who were involved in 23 classes that were taught by 10 physical education teachers at three secondary schools.

Measures

Physical activity engagement data were collected by means of a self-report questionnaire. The stem for the questions were: “In the next two questions physical activity means all activities which raises your heart rate or momentarily gets you out of breath for example in doing exercise, playing with your friends, going to school, or in school physical education. Physical activity also includes for example jogging, intensive walking, roller skating, cycling, dancing, skating, skiing, soccer, basketball and baseball.” The items were: “Think about your typical week. How many days did you exercise for at least 60 min during which you get out of breath” and “Think about your last 7 days. How many days did you exercise for at least 60 min during which you get out of breath?”. Both items were presented using an eight-point response scale (0 to 7 days in a week). A sumscale of physical activity engagement was formulated by adding the response scores for the two items. The two items were developed to analyze students’ self-reported engagement in both moderate to vigorous and vigorous physical activity. The two physical activity engagement items have been reported to indicate adequate levels of reliability in adolescent samples (Prochaska, Sallis, and Long 2001; Vuori *et al.* 2004).

Perceived competence in the physical activity setting was analyzed by using a modified Finnish version of the sport competence sub-scale of Physical Self-Perception Profile (PSPP; Fox 1990; Fox and Corbin 1989). Each item was rated on a five-point Osgood scale (e.g., “(1) I am: good at physical activity to (5) poor at physical activity”). The Finnish version of PSPP subscale is titled the Physical Activity Competence Scale (PACS). This study had the individual item stem of “What am I like?”. The five key

themes covered in the items were physical ability, athletic ability, confidence, skill level, and participation. Scale score was calculated by summing item scores for the sport competence subscale. Research has shown that the Finnish version of the PACS has demonstrated satisfactory levels of validity and reliability (Jaakkola 2002).

In the present study we used the Finnish version of the sport enjoyment subscale of the Sport Commitment Model (Scanlan *et al.* 1993). This version of the subscale includes four items to evaluate the themes of enjoyment, pleasure, fun, and happiness, modified to reflect a physical education context (i.e., “In my physical education class...”) and rated on a five point Likert scale (1 = strongly agree to 5 = strongly disagree). The Finnish version of the sport enjoyment subscale has been found to be a valid and reliable tool in Finnish sport psychology research (Soini 2006).

All measures were translated from English to Finnish by a panel of experts in sport psychology and later back into English by a translator whose first language is English and was skilled in Finnish. The back-translated English version was compared with the original version for consistency. The panel of experts discussed items that were shown to have number of possible meanings in Finnish in order to redraft them to minimize any confusion regarding meaning.

Balance skills were measured by using the Flamingo standing test, which is one test item of the motor test section of the Eurofit test battery, which is widely used in physical education in European countries (Eurofit 1988). The Flamingo test measures static balance. In the test procedure, the participants stand for 30 s on one leg balanced on a 50 cm long, 4 cm high, and 3 cm wide wooden beam. The free leg is bent backwards and the back of the foot gripped with the hand on the same side. There was no practicing time before the test. Each time the participant lost balance by releasing the free leg or when the participant touched the floor with any parts of the body, the stopwatch was stopped. After each loss of balance, the same procedure was started again. The number of attempts required within the 30 s time period was the participant’s final score. The test was executed twice (2 x 30 s), first with the right leg and then with the left leg, and the scores summed. The researcher announced time limits, recorded the attempts, and provided support for participants as required before each trial. The Flamingo test has been demonstrated to be reliable tool to analyze children’s balance skills (Nupponen 1997; Tsigilis, Doua, and Tokmakidis 2002).

Manipulative skills were assessed using the figure-8 dribbling test in which the task is to dribble a volleyball around a figure-8 track, first using the feet (30 s) and secondly using the hands (30 s). Participants were permitted two practice rounds. The participant starts behind the starting line and following the “go” signal starts to dribble the ball with their feet along the figure-8 track. The track includes arrows indicating the dribbling direction. Both the participant and the ball must go around three marker cones, that are 2.5 meters apart and set in a straight line. After 30 s the researchers give a “change” instruction and the manipulation style is switched to hand-dribbling. In the hand-dribbling task the ball does not have to pass the cones, only the participant. Changing of the dribbling hand was allowed. The total dribbling time is 1 min. If the ball leaves the test area (i.e. ringed zone constructed of wooden gymnastic benches) the stopwatch was not stopped. The final result is the total number of crossed lines in one minute. The dribbling test is one part of the widely used Finnish Fitness Test Package (Nupponen *et al.* 1999). Nupponen (1997) found the dribbling test to be reliable tool in measuring manipulative skills within Finnish school students.

The shuttle running test was used to measure students’ locomotor skills. The shuttle running test is widely used in Finnish physical education because it is part of a physical fitness test package, which teachers implement twice a year throughout secondary schools (Nupponen and Telama 1998). In the shuttle running test the task is to run as fast as possible 10 times over a 5 m distance, alternating between the forward and backward direction. Both legs should pass the 5 m marker line at each turn. The result is the running time to cover the 10 shuttles. This test is a modification of a widely used shuttle running test, where the participants run forward all the time. We modified the original shuttle run test by including both forward and backward directions. Research has demonstrated that shuttle running test is a reliable tool to analyze children’s locomotor skills (Fjortoft 2000; Houwen *et al.* 2006).

Procedure

The data was collected during regularly timetabled PE classes. The students responded to the instruments under the supervision of their PE teacher. All motor skill tests were conducted in the school gym. The researchers coordinated the testing sessions and recruited assistance from the PE teaching staff as required. Each test period started with a warm-up phase. The test protocol lasted approximately 90 min. Participation

in all areas of the data collection was voluntary. Students were informed that all data was confidential and would only be used by the researchers for the purposes of this study. The University of Jyväskylä ethics committee approved the study. Written consent from parents was also required for students to participate in the study.

Data analysis

The validity and reliability of the questionnaires were analyzed by confirmatory factor analysis and internal consistency analysis using Cronbach's alpha. Confirmatory factor analysis was undertaken using AMOS 7.0 software and the maximum likelihood method (Arbuckle 2006). A single model was constructed a priori for the data set for each of the Physical Activity Competence Scale and Enjoyment in Sport Questionnaire and the solution evaluated using a variety of well known fit indices including the Tucker-Lewis Index (TLI), the Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA). The TLI and the CFI indices can vary from 0 to 1. The closer to one, the better the model fit is considered to be. In addition, the root mean square error of approximation (RMSEA) of <0.05 , is indicative of representative model. Finally, the ratio of CMIN/df is suggested to present a good fit if it is below 5. Common factors were allowed to be correlated. No correlated residuals were permitted. The data were summarized using descriptive statistics, and the relationships between variables determined using Pearson's correlation coefficients and stepwise regression analyses. Effect size was determined based on the formula, $f^2 = R^2/(1 - R^2)$. The f^2 value is interpreted based on guidelines of .02, .13, and .26 as small, moderate, and large, respectively. Additionally, gender differences were analyzed using independent samples t -tests and Cohen's d . The d value is interpreted based on guidelines of .20, .50, and .80 as small, moderate, and large, respectively (Cohen 1988).

Results

Validity and reliability of the scales

Resultant fit indices derived from the CFA of the primary models of the Physical Activity Competence Scale and the Enjoyment in Sports Questionnaire indicated adequate fit of the data for both scales (Table 1). The goodness-of-fit indices demonstrated more consistent patterns than re-

ported in previous Finnish studies (Jaakkola 2002; Soini 2006). Cronbach's alpha coefficient for the Physical Activity Competence scale and the Enjoyment in Sports Scale were .88 and .94, respectively, indicating high reliability of each scale. The correlation coefficient for the two items measuring physical activity was .81.

Table 1 *Results from Confirmatory Factor Analyses for the Physical Activity Competence Scale and Enjoyment in Sports Questionnaire (n=398)*

	Physical Activity Scale	Enjoyment in Sport Questionnaire
CMIN	34.73	.74
df	5	2
CMIN/df	6.95	.37
TLI	.91	1.00
CFI	.97	1.00
RMSEA	.12	1.00

Descriptive statistics

The descriptive data is shown in Table 2. Mean scores for both males and females indicated that on average the participants exercised at least 60 minutes per day approximately four times per week. The results showed that the mean scores for students' enjoyment in physical education were rather high. The t-tests revealed that the girls scored better in the balance test $t(391) = -2.07, p = 0.039, d = 0.21$, whereas the boys scored better in the figure-8 dribbling test $t(350) = -5.02, p = 0.000, d = 0.54$. Additionally, the

Table 2 *The Descriptive Statistics for Locomotor, Manipulative, Balance Skills as well as Physical Activity, Enjoyment and Perceived Competence*

	Boys			Girls		
	mean	standard deviation	n	mean	standard deviation	n
Figure-8 test ^a	15.47	3.08	177	13.91	2.76	175
Running test ^c (s)	24.65	4.02	178	24.20	2.13	172
Balance test ^c (errors)	12.08	5.41	179	10.85	5.79	176
Activity ^b	4.29	1.75	188	4.19	1.70	205
Enjoyment	3.83	.97	188	3.68	1.12	209
Perceived competence ^c	2.62	.84	191	2.79	.82	209

Notes ^a score from crossed lines

^b items scored 0 to 7

^c results are scored in the negative direction

boys perceived higher levels of sport competence $t(398) = 2.07, p = 0.039, d = 0.21$). No significant gender differences emerged from analysis of the shuttle running test scores, the level of physical activity engagement or enjoyment.

Correlation analysis

Pearson’s correlation coefficients for all measures are shown in Table 3. Results indicated that for the boys significant moderate correlations were found between perceived physical activity competence and figure-8 dribbling test, physical activity and enjoyment. Results demonstrated that for the girls significant moderate correlations exist between shuttle running and balance test, figure-8 dribbling test, perceived physical activity competence and enjoyment; and between enjoyment and balance test and perceived physical activity competence. All other correlations demonstrated only weak relationships between variables.

Table 3 *Correlations among Students’ Fundamental Movement Skills, Physical Activity, Enjoyment, and Perceived Competence*

	1	2	3	4	5	6
1. Figure-8 test		-.42 ^{***}	-.21 ^{**}	.02	.21 ^{**}	-.12 ^{***}
2. Running test	-.22 ^{**}		.44 ^{***}	-.04	-.37 ^{***}	.32 ^{***}
3. Balance test	-.16 [*]	.25 ^{***}		-.09	-.31 ^{***}	.27 ^{**}
4. Physical activity	.17 [*]	-.02	-.09		.11	-.20 ^{**}
5. Enjoyment	.17 [*]	-.12	-.07	.28 ^{***}		-.44 ^{***}
6. Perceived competence	-.30 ^{***}	.28 ^{***}	.16 [*]	-.34 ^{***}	-.47 ^{***}	

Note 1 Correlations for boys below the main diagonal and for girls above the main diagonal.

Note 2 * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Regression analyses

We conducted a multiple stepwise regression analysis in order to examine whether gender, fundamental movement skills, enjoyment, and perceived physical activity competence predicted physical activity engagement. In each analysis, gender, fundamental movement skills, enjoyment, and perceived physical activity competence were independent variables, and physical activity engagement represented the dependent variable. The model was statistically significant, $F(1,317) = 18.64, p < .000$, and accounted for 5% of the variance in physical activity engagement (adjusted $R^2 = .05$). The only variable that entered into the regression model that

was found to be significant was perceived physical activity competence ($\beta = -.24$). The adjusted R^2 value of .05 translates into an f^2 value of .05, which constitutes a small effect size.

Discussion

The aim of the study was to investigate the role of enjoyment, perceived physical activity competence, and fundamental movement skills as correlates of physical activity engagement in Finnish physical education students. Although we have preliminary evidence that motivation and motor skills are important antecedents of physical activity in early childhood, we do not as yet have studies where these variables have been evaluated simultaneously within secondary school children.

Perceived physical activity competence was the only significant predictor of physical activity engagement within this sample of Finnish Grade 7 students. This finding is in accordance with earlier studies demonstrating a positive association between perceived competence and physical activity (e.g., Bagoien and Halvari 2005; Carroll and Loumidis 2001) and suggestions that perceived competence is an antecedent of physical activity in children and adolescents (Sallis *et al.* 2000). The resultant association between perceived competence in sport and students' physical activity engagement has several pedagogical implications. Strategies that physical education teachers use can support student's competence in sport-oriented activities and, thus, may benefit their participation in physical activity, at least within school physical education. In sport psychology, researchers have proposed the development of a task-involving motivational climate as an approach for promoting students' perception of competence (Epstein 1989; Nicholls 1989; Roberts 2001). Intervention studies in which the purpose has been to increase task-involving motivational climate have also contributed to increases in participants' perceived competence in physical activity settings (Grieve *et al.* 1994; Theeboom, DeKnopp, and Weiss 1995; Wallhead and Ntoumanis 2004). Those interventions have applied TARGET model of Epstein (1989) to increase task-involving motivational climate in an activity. Although we did not investigate the association between task-involving motivational climate, perceived competence, and physical activity, based on the results of earlier studies we recommend that teachers adopt the principles of

task-involving motivational climate to support students' perceived competence and, as a consequence, their physical activity levels.

In contrast to previous research (e.g., Kremer, Trew, and Ogle 1997; Wallhead and Buckworth 2004), enjoyment in physical education was not a significant predictor of physical activity engagement. Wallhead and Buckworth (2004) found that enjoyment in school physical education was related to motivation to adopt a physically active lifestyle outside school hours. A possible reason for the weak association between enjoyment in physical education and physical activity engagement observed in the current data, is that enjoyment was evaluated in the specific context of physical education, whereas the questions pertaining to engagement were related to more general exercise and physical activity behaviors. This suggests that Finnish adolescents may make the distinction between involvement in physical education as an enjoyable learning and social activity, and physical education as an opportunity to further engage in moderate to vigorous physical activity.

The finding that fundamental movement skill scores did not significantly predict engagement in physical activity is in contrast to previous research (e.g., Fisher *et al.* 2005; Okely *et al.* 2001; Wrotniak *et al.* 2006). In this study physical activity was only analyzed by self-report, and the information collected was limited to details regarding the number of days of engagement in moderate to vigorous physical activity per week. Fisher *et al.* (2005) and Wrotniak *et al.* (2006), for example, used accelerometers in analyzing physical activity in their studies. An additional issue may be that the fundamental movement skills data was derived using only 13 years-olds. At this age the inter-student variation in physical development is substantial, and different individuals may be physically active but generate lower scores in relation to their peers in regards to locomotor and manipulative measures we used due the maturational status of attributes such as strength or anaerobic capacity (Ozmun and Gallahue 2005). Assessment of fundamental movement skills for the purpose of comparison with other variables may be more effectively undertaken involving samples at the pre, mid, and post adolescent phases.

The second research task was to examine gender differences in all measured variables. In line with earlier findings (e.g., Thomas and French 1985; Toole and Kretzschmar 1993; Wieczorek and Adrian 2006) the current results revealed that the girls made fewer errors in the balance skill task. The study also demonstrated that the boys had better results in the figure-8 dribbling test, further supporting existing evidence that

showed that boys outperform girls in manipulative skills, (Castelli and Valley, 2007; Junaid and Fellowes, 2006; Okely et al, 2001). No gender differences emerged in the running test scores, which is contrary to other investigations that have found differences between genders in locomotor skills (Nupponen and Telama, 1998; Wrotniak et al., 2006). In the current study, however, we modified the original shuttle run test by including both forward and backward directions to better highlight the locomotor skill elements as characteristics of strength. In the Nupponen and Telama (1998) study the shuttle running test used traditional method that only involved running in the forward direction. The differences in the current results and Nupponen and Telama's study mean that gender differences in the running skills of seventh grade Finnish students may be dependent on the type of task used to evaluate this fundamental movement skill. In Finland, boys and girls sport and exercise activities typically differ from each other. The Finnish national survey on children's sport hobbies indicated that boys were more active in ball games and the most popular sporting hobbies among boys were football, ice-hockey, and floorball. In contrast, the main girls' hobbies were aerobics, gymnastics, horse-riding, dancing, and figure skating (Nuori Suomi 2006). The boys in the current study demonstrated higher levels of perceived competence in physical education, which is in accordance with previous research (Biddle *et al.* 1993; Wang *et al.* 2006). Furthermore, we did not find significant differences between the girls and the boys in enjoyment. Soini (2006) found, however, that in his sample of 15-year-old Finnish physical education students, the boys rated physical education as a more enjoyable experience than the girls. The difference in the age might be one reason why these two studies differ in the girls' and the boys' level of enjoyment. Lastly, we did not find significant differences between the girls and the boys in their level of physical activity engagement, whereas Samdal *et al.* (2007) found clear gender differences, with boys scoring higher in self-reported involvement in regular vigorous physical activity. A possible reason for these contradictory results might be that Samdal *et al.* (2007) measured vigorous physical activity across three age groups including 11, 13, and 15 year-old boys and girls while in the current study the focus was on only 13 year-olds. Previous evidence has shown that it is the older adolescent groups that demonstrate the greatest gender differences in engagement in physical activity (McQuillan and Campbell 2006). Furthermore, a large survey for 5505 3-18 years-old Finnish children and adolescents, investigating physical activity engagement,

revealed that no gender differences emerged when all types of physical activities were analyzed (Nuori Suomi 2006), which suggests an atypical pattern of physical activity engagement may be demonstrated by Finnish children and youth.

Cross-sectional design is one of the limitations of this study. The use of only cross-sectional data makes it difficult to identify the antecedents of engagement in physical activity within younger adolescent samples. Another limitation of this study is the use of the self-report format in measuring physical activity engagement. In some studies self-report measures of physical activity have been shown to have limited reliability and validity particularly in relation to samples including children (Shephard 2003). Self-report questionnaires, however, were the most practical instruments for use in this study because the use of more objective measures typically adds extra cost and time to the data collection phase. Finally, our use of a product-oriented rather than process-oriented assessment of fundamental movement skills may be considered as a further limitation (Okely *et al.* 2001). Process-oriented tests break down skills, such as the running and leaping, into specific observable components (e.g., Ulrich 2000) but are more complex and difficult to administer. Although we fully acknowledge these limitations, this study was the first attempt to analyze motivational factors and fundamental movement skills as antecedents of physical activity engagement of younger adolescents.

In future it would be beneficial to further study the effect of motivational and motor skill factors on physical activity engagement patterns using a longitudinal design and involving samples from the three key stages of adolescence (i.e., early, middle, late). This would give us important information on the development of the antecedents of physical activity participation in school students. Additionally, physical education based intervention studies (e.g., motivational climate) structured to evaluate the effect of improving students' perceived competence as a strategy for the promotion of adolescent engagement in physical activity.

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