

Taru Lintunen

Self-Perceptions, Fitness, and  
Exercise in Early Adolescence:  
A Four-Year Follow-Up Study



UNIVERSITY OF JYVÄSKYLÄ

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*This thesis is dedicated to my nephew Lauri and all the children at Vaskonmäki.*

## ABSTRACT

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The aim of the present longitudinal study was to follow the development of self-perceptions during early adolescence. Another aim was to study the possible psychological benefit gained from regular exercise. A Perceived Physical Competence Scale (PPCS) with two sub-indices - Perceived Fitness and Perceived Appearance - was developed for the present study. In addition, self-esteem was assessed using the Rosenberg Self-Esteem scale, and physical fitness and anthropometric characteristics measured with six indicators. The subjects (n=113) were 11 years old at the first of the five annual measurements. Additional subject groups were used when validating the PPCS. The follow-up sample was discretionary with the aim of forming high contrast groups based on level of natural involvement in exercise. MANOVA- and Simplex- models were used in the analysis. Self-perceptions were very stable and at a high or moderate level during early adolescence. The self-perceptions of the girls, however, were lower and more unstable than those of the boys. The results for the girls indicated an increase in perceived fitness during the follow-up period in the physically active groups but not in the sedentary group. The active boys already had higher perceptions of their fitness at the beginning of the study than the sedentary group. The self-esteem of the different activity groups did not differ. These results support to the view that exercise increases perceptions of physical competence but not self-esteem. Physical fitness explained perceived fitness according to Sonstroem's hypothesis. The effect become weaker among the older boys and stronger among the older girls. Thus perceptions of fitness become more realistic among the girls and more unrealistic among the boys.

Keywords: self-perceptions, adolescence, exercise, fitness, follow-up study, perceived physical competence, perceived fitness,

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This study was carried out as a part of a larger multidisciplinary, longitudinal research project "Children and Sport" aiming to elucidate the relationships between physical activity, growth, health, physical fitness, and the psychological well-being of children. This project has been my intellectual home as a researcher. In this group inexperience was no hindrance to independent research. I was allowed to make my own research plan and carry it out.

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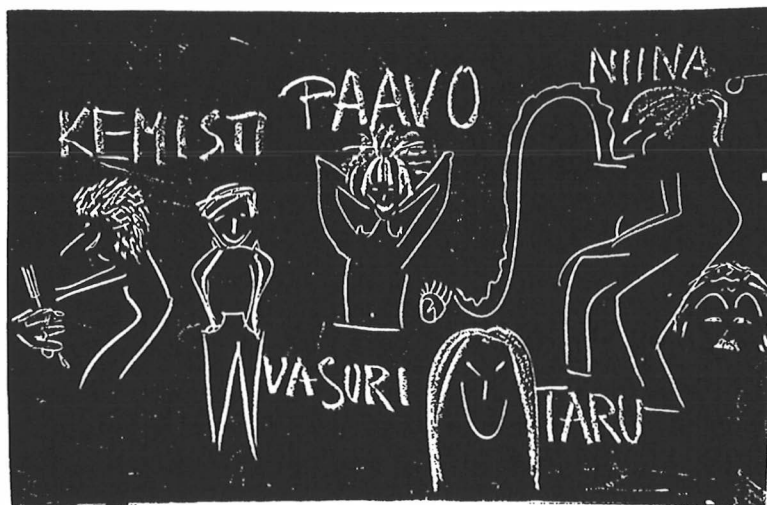
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One young participant's perception of the researchers

## CONTENTS

ABSTRACT

ACKNOWLEDGEMENTS

LIST OF ORIGINAL PUBLICATIONS

1	INTRODUCTION .....	13
2	SELF-PERCEPTIONS IN COGNITIVE PSYCHOLOGY .....	15
	2.1 The terminology of self-perceptions in cognitive psychology ...	16
	2.2 The structure of self-perceptions .....	17
	2.3 Measuring self-perceptions .....	17
	2.3.1 Measuring perceived physical competence .....	18
	2.3.2 Measuring self-esteem .....	22
3	DEVELOPMENT OF SELF-PERCEPTIONS IN ADOLESCENCE .....	23
	3.1 Studying Change .....	24
	3.2 Changes and differences in mean levels of self-perceptions ....	24
	3.3 Stability of self-perceptions .....	26
4	SELF-PERCEPTIONS AND EXERCISE INVOLVEMENT .....	28
	4.1 Change, selection and exercise .....	28
	4.2 Relationships between exercise involvement and self-perceptions .....	29
5	FRAMEWORK AND AIMS OF THE STUDY .....	31
	5.1 Framework of the study .....	31
	5.2 Aims of the study .....	32
6	METHODS .....	34
	6.1 Participants of the follow-up study .....	34
	6.1.1 Classification of the participants according to exercise activity .....	35
	6.2 Additional participants in the validation of the perceived physical competence scale .....	36
	6.3 Procedure .....	37
	6.4 Statistical methods .....	37
	6.5 Instrumentation .....	37
	6.5.1 Construction of the perceived physical competence scale .....	38
	6.5.2 Factor structure of the perceived physical competence scale .....	39
	6.5.3 Reliability of the perceived physical competence scale .....	42

6.5.4	Validity of the perceived physical competence scale .....	43
6.5.5	Perceived importance scale .....	44
6.5.6	Other measures used in the study .....	44
7	RESULTS .....	46
7.1	Chance and stability in self-perceptions .....	46
7.1.1	Perceived fitness .....	46
7.1.2	Perceived appearance .....	47
7.1.3	Self-esteem .....	48
7.2	Exercise and self-perceptions in three activity groups .....	48
7.3	Relationships between physical fitness, perceived fitness, and self-esteem .....	52
8	DISCUSSION .....	56
8.1	The perceived physical competence scale .....	56
8.2	Development of self-perceptions .....	59
8.2.1	Changes in the mean levels of self-perceptions .....	59
8.2.2	Stability of self-perceptions .....	60
8.3	Exercise and self-perceptions .....	62
8.4	Relationships between physical fitness, perceived fitness, and self-esteem .....	64
8.5	Limitations of the study .....	65
8.6	Future research .....	66
9	YHTEENVETO .....	67
	REFERENCES .....	72
	APPENDICES .....	84

## LIST OF ORIGINAL PUBLICATIONS

The thesis is based on the following papers which will be referred to in the text by their Roman numerals I-IV:

- I Lintunen, T. (1987). Perceived physical competence scale for children. *Scandinavian Journal of Sports Sciences*, 9, 57-64.
- II Lintunen, T., Heikinaro-Johansson, P. & Sherrill, C. (1995). Use of the perceived physical competence scale with adolescents with disabilities. *Perceptual and Motor Skills*, 80, 571-577.
- III Lintunen, T., Leskinen, E., Oinonen, M. Salinto, M. & Rahkila, P. (1995). Change, reliability, and stability in self-perceptions in early adolescence: A four-year follow-up study. *International Journal of Behavioural Development*, 18, 351-364.
- IV Lintunen, T., Leskinen, E. & Rahkila, P. Self-perceptions and physical fitness of active and sedentary adolescents - a follow-up study, submitted for publication.

In addition, some unpublished results are presented.

# 1 INTRODUCTION

Most personality theories and trends in therapy share the assumption that an individual's self-esteem and cognitive self-perceptions are central psychological resources and indicators of adaptation to the world. They are implicated in motivational factors, psychological well-being and social relations. Self-esteem has also been identified as the variable with the greatest potential to reflect the possible psychological benefit gained from regular exercise (Folkins & Sime, 1981; Fox, 1991; Hughes, 1984; Sonstroem, Harlow, Gemma & Osborne, 1991). Knowledge about the development of self-perceptions is also important in education. A positive view of self is often mentioned as an educational goal at school.

Numerous interventions have been carried out with the aim of increasing self-esteem or perceptions of competence. However, notably little attention has been paid to how self-perceptions naturally develop during adolescence, when great bodily changes take place. One aim of the present longitudinal study was to describe the perceptions which children have of themselves in general, and of their physical characteristics, and follow the development of these self-perceptions over a period of involvement in sports during early adolescence.

Because no multidimensional measure for studying self-concept was available at the outset of the study, one aim of the present study was to devise a measure which would provide a profile of perceived physical competence in late childhood and early adolescence. Hence the Perceived Physical Competence Scale was developed.

Positive emotional and psychological benefits are commonly believed to result from physical exercise. There are principally two models dealing with the relationship between physical activity and psychological well-being - the change model and the selection model (Bakker, Whiting & Brug, 1990, 60-62; Kirjonen & Telama, 1984; Cratty, 1989, 46). According to first, it is possible that changes in the personality become apparent as a consequence of exercise. The selection model on the other hand suggests that those who already have certain characteristics are more likely to engage in sport and persist at participation.

Change effects have most often been studied by interventions designed to enhance physical activity. Methodological and design problems are, however, evident in exercise interventions (McAuley, 1994).

It is possible, nonetheless, to avoid some of the problems of experimental studies and to bolster both the change and selection models by following the natural history of habitual physical activity longitudinally and to group individuals afterwards according to registered activity patterns (Kemper, 1994; Mednick, 1981). For practical reasons this kind of research is rare. No long term follow-up research with multiple measurements on the natural history of physical activity and self-perceptions has been documented before the present study.

Motivational theories have consistently featured self-perceptions in a key role (Atkinson, 1964; Bandura, 1977; Harter, 1978; White, 1959). In general, belief in one's ability creates expectations of success, which in turn direct choice and persistence in behaviour. Given the opportunity, those behaviors are sought that provide a sense of competence, and those avoided that carry a high probability of failure. In the physical activity domain Sonstroem (1978) developed the Psychological Model of Physical Activity, which describes the relationships between exercise, physical ability, perceived competence and self-esteem. According to the model, perception of physical competence is a mediating factor between objective physical ability and self-esteem. In addition, positive perceptions of physical competence lead to a more positive attitude towards activity, which in turn leads to higher levels of voluntary involvement in physical activity. One aim of the present study was to test Sonstroem's hypothesis that perceptions of physical fitness may be a mediating variable between physical fitness and self-esteem.

Sonstroem's model is an example of a systemic multidisciplinary approach, which provides a contextual frame of reference for developmental studies (Nurmi, 1983). It recognizes the intimate interdependence of personality and physiology, and tries also to specify some of the central developmental mechanisms. Any full understanding of the growth of a child and its associations with exercise must be based on a wider understanding of physical, physiological, psychological and social interactions.

Research on the physiological level has traditionally been carried out separately from psychological and social levels of the reality. Recently, increased interest has been shown in the relationships between psychological and physiological aspects. Empirical studies, however, are rare. Connecting the cognitive psychological and physiological levels of the individual has even been thought to be impossible (Niemi, 1985). In the present study psychological, physiological and behavioral characteristics of the adolescents are studied simultaneously in a multidisciplinary way.

The present study was implemented as part of a larger longitudinal multidisciplinary research project, Children and Sport (Lintunen, Rahkila, Silvennoinen, Osterback, 1984). Altogether the study took five years. The project was launched in 1982 at the Research Unit for Sport and Physical Fitness (later LIKES Research Center) in Jyväskylä.

## 2 SELF-PERCEPTIONS IN COGNITIVE PSYCHOLOGY

The diversity of theoretical approaches to concepts of the self and self-perceptions is immense. In particular, psychodynamic (Eagle, 1984, 115-123, 207), systemic (Vuorinen, 1983, 2, 31, 1986a, 1986b, 1990, 104-105) and cognitive (Bandura, 1977, 1990; Guidano & Liotti, 1985; Harter, 1978, 1986b; Kelley, 1967; Markus, 1977; Rotter, 1966; Seligman, 1975) theories and models are of use in understanding the function, structure, and content of self and self-perceptions. Nonetheless, questions concerning the structure and the development of the self and self-perceptions are not answered satisfactorily.

Classic psychoanalytic theory understands self-perceptions as a secondary and drives as primary characteristics of the psyche. According to the cognitive approach, concepts and perceptions of the self develop gradually in children in connection with need satisfaction. The affective-cognitive content of these concepts and perceptions begins to regulate psychological functions. If need satisfaction is sufficient, it facilitates the development of positive perceptions. And, analogously, stress, frustrations and feelings of incomplete need satisfaction produce negative self- and object perceptions. (Toskala, 1991, 15-17).

Cognitive theories dominate research on self-perceptions. The psychodynamic approach is seldom used. This approach might, however, help in interpreting the results acquired using the cognitive approach, which accepts the existence of defences, tacit knowledge or the "I" part of the self (Guidano & Liotti, 1985) but seldom concentrates on them. This is of current interest, because empirical cognitive-oriented research is beginning to understand, for example, that self-perceptions often are biased and unrealistic (Taylor & Brown, 1988).

## 2.1 The terminology of self-perceptions in cognitive psychology

The terminology of cognitive psychology is used in the present study. Self-perceptions or self-concept are terms used when speaking of this phenomenon in general. More exact and detailed concepts in the present study are perceived competence and self-esteem.

Perceived competence is term used in the achievement and mastery motivation literature indicating the sense an individual has of his or her abilities as a result of cumulative interactions with the environment (Feltz, 1988; Harter, 1978; Nicholls, 1984; Weiss, McAuley, Ebbeck & Wiese 1990). The sense of competence describes the subjective side of one's actual competence. The concept of perceived competence underpins many currently favored approaches, such as attributions, goal orientation and intrinsic motivation (Biddle, 1995).

Researchers have investigated perceptions of ability using somewhat different conceptual definitions. Some researchers have asked subjects to express ability judgements in specific situations (Bandura, 1977); others have studied more general concepts. Self-efficacy and performance expectations are more situation-specific measures, and measures of perceived competence more general. Both are concerned with perceptions of ability (Lirgg, 1992).

Perceived physical competence refers to an objective or cognitive appraisal of the physical self. It seems to be particularly central in late childhood and early adolescence when activity-related physical attributes and comparison with others - especially with other children - become important elements of the self (Damon & Hart, 1982). At this age the life of the child expands outside the home and, for example, coached or organized sports begin to affect the development of many children. Physical characteristics are of great importance when seeking the acceptance of peers, parents, teachers and coaches (Harter, 1982; Roberts, 1984; Silvennoinen, Lintunen, Rahkila & Österback, 1984).

Self-esteem means an overall or general evaluative attitude towards the self, a feeling of being satisfied with oneself and feeling that one is a person of worth (Rosenberg, 1985, 210). According to Erikson (1959, 89), self-esteem is a feeling about the self that tends to remain constant across the life-span and provides a person with a coherent psychological basis for dealing with the demands of social reality. The degree of congruence between beliefs concerning one's own value and ongoing estimates of one's own behavior and emotions represents the degree of self-esteem (Guidano & Liotti, 1983, 69). Self-esteem, at this level, is different from conscious self-evaluation. "It is one thing to verbally state, and consciously believe, that one is highly pleased with oneself, and another to exhibit the quiet confidence, emotional stability, frustration tolerance, openness to new experience, and lack of defensiveness that can theoretically be expected of people with high self-esteem at the level of a fundamental postulate in their experiential self-system" (Epstein, 1985, 302). The difference between conscious self-esteem and deeper self-evaluations has seldom been discussed in empirical research. It should, however, be taken into account when interpreting the results of conscious self-evaluations.

Scholars usually draw a distinction between self-esteem and perceived competence (Campbell & Lavalley, 1993; Shavelson, Hubner, & Stanton, 1976;



Zion, 1965). Little research has been reported on whether people perceive a difference between the cognitive and emotional areas of the self. All descriptions of the self probably involve some emotional loading; thus perceived competence is also an expression of self-esteem.

Most personality theories and trends in therapy share the assumption that an individual's self-esteem and perceptions of competence are central psychological resources and indicators of adaptation to the world. They are implicated in motivational factors, psychological well-being and social relations (Bandura, 1982; Covington, Omelich & Schwarz, 1986; Damon & Hart, 1988, 2-17; Duda, 1992; Harter, 1978; Guidano & Liotti, 1985; Rosenberg, 1979, 54-57; 1985, 205-211; Vuorinen, 1990, 14, 91-113; White, 1959). According to Epstein (1985), among the major sources of motivation in a personal comprehension of reality are the need to enhance self-esteem and the need to maintain the stability and coherence of the conceptual system. According to systemic comprehension, the self actively organizes a person's inner experience and outer behavior. We try to act in a way which enables us to have a positive or at least satisfactory conscious experience of ourselves (Vuorinen, 1990, 14, 91-113).

## **2.2 The structure of self-perceptions**

Historically, self-concept researchers emphasized a broad global construct that did not differentiate between self-perceptions in physical, social, academic, and other domains. This unidimensional view has been challenged by Shavelson, Hubner, and Stanton (1976), who reviewed empirical and theoretical research and posited a model of self-concept. According to their model, self-concept is posited to be multifaceted and hierarchically organized, and differentiated from objective indicators that underly the formation of self-perceptions. They proposed a general self-concept defined by academic and nonacademic self-concepts: the academic self-concept was divided into self-concepts in particular content areas (e.g. English and mathematics); the nonacademic self-concept was divided into social, physical, and emotional self-concepts. The physical self-concept was further divided into self-concepts of physical ability and physical appearance. General self-concept appears at the apex of the hierachical model and it is divided to sub-level components. Task specific self-efficacies are at the lowest level of the hierarchy. Marsh and Shavelson (1985) concluded that self-concept can not be adequately understood if its multidimensionality is ignored.

## **2.3 Measuring self-perceptions**

Despite the theoretical and practical significance of the construct until recently, reviews of self-perception research emphasized the lack of theoretical models for defining and interpreting the construct, the poor quality of measurement instruments to assess it, and methodological shortcomings (Marsh & Jackson,

1986; Marsh & Peart, 1988).

At the time Shavelson et al. (1976) developed their model the multidimensionality of self-concept was not broadly accepted. Self-concept instruments typically consisted of items that were not designed to measure specific components. More recently, researchers have developed scales to measure particular facets of self-concept, and then used factor-analytic techniques to test for these a priori facets (Fox & Corbin, 1989; Harter, 1982, 1988; Marsh, Barnes, Cairns & Tidman, 1984). The results have provided strong support for the multidimensionality of self-concept.

### 2.3.1 Measuring perceived physical competence

Numerous scales have been constructed for measuring perceived physical competence. Illustrative of this diversity is that 11 different terms, namely physical appearance and attributes, physical self, physical estimation, physical self-concept, perceived physical abilities, perceived physical competence, physical performance capacity and health, sport-specific personal ability, general ability in sports, potency and activity, and physical self-perception (a review of the scales is given in Table 1) have been used to describe the construct referred to in the present study as perceived physical competence. In addition, five terms have been used to describe satisfaction with one's own physical characteristics (Table 1).

TABLE 1 Review of the trait measures of perceived physical competence and physical self-esteem

REFERENCE	SCALE AND ACRONYM	DESCRIPTION: FORM OF THE QUESTIONS AND SELECTION OF THE ITEMS
PERCEIVED PHYSICAL COMPETENCE		
Piers & Harris 1964	Physical Appearance and Attributes (A subscale of the Piers-Harris Children's Self-Concept Scale)	An original pool of items was developed from Jersild's (1952) collection of children's statements. Five yes-no format items. The items of the subscales are often summed to form an index of global self-concept (see also Shavelson & al. 1976).
Fitts 1965	Physical Self (A subscale of the Tennessee Self Concept Scale) TSCS-SS	Five-point Likert scale with 18 items. An individual's view of his body, state of health, physical appearance, skills, and sexuality. (see also Watson 1984)

(Continues)

TABLE 1 (Continues)

Neale & al. 1969, Sonstroem 1974, 1976, 1978, Sonstroem & Kampper 1980	Physical Estimation (A subscale of the Physical Estimation and Attraction Scale) PEAS	33 true-false format items. The attitude object is the self as possessor or potential possessor of muscular strength, general athletic ability, physical fitness and coordination. Certain items refer to attributes of skill or potential in specific sport activities. (see also Dishman 1980; Fox & al. 1985; Safrit & al. 1985)
Merkley 1981	Physical Self- Concept	Perception of one's self in relationship to one's surroundings dealing specifically with physical activity. 6 factors, 27 items using the Osgood Semantic Differential Technique. Intuitively designed items which the researcher believes to have the strongest effect on human performance.
Ryckman & al. 1982, 1985	Perceived Physical Abilities PPA	This six-point Likert Scale with 10 items was created to deal with individuals' generalized expectancies concerning their perceived competence in performing tasks involving the use of physical skills (see also McAuley & Gill 1983).
Harter 1982	Perceived Physical Competence (A subscale of the Perceived Competence Scale for Children)	This instrument provides a profile of the child's perceived competence in the physical domain with the focus on sports and outdoor games. Includes seven items. A new question format was designed to offset the tendency to give socially desirable responses.
Harter 1988	Perceived Athletic Competence (A subscale of the Self-perception Profile for Adolescents)	This subscale taps the adolescent's perception of his/her athletic ability and competence at sports. Comprises five items.
Paulus 1982	Physical Performance Capacity and Health Awareness of the Self	A four-point Likert scale with 15 items derived from factor analysis. Items are taken from other scales and developed in this study. The concept of the acceptance of one's own body is theoretically separated from other concepts of physical self-concept.

(Continues)

TABLE 1 (Continues)

Passer 1983	Sport-Specific Personal Ability	"Compared to most other boys your age, how good are you at soccer?" One question, 9-point scale.
	General Ability in Sports	"Compared to most other boys your age, how good are you at sports in general?" One question, 9-point scale.
Mrazek 1984	Potency and Activity (A subscale of the self-concept measure)	Six items using the seven-point Osgood Semantic Differential technique. The items were designed to deal with the body (the appearance of the body and physical capacity).
Fox & Corbin 1989 Fox 1990	The Physical Self- Perception Profile PSPP Subscales: SPORT, CONDITION, STRENGTH, PHYSICAL SELF-WORTH	Four six-item subscales using Harter's question format. The content of the scale is derived from open-ended questions. Sports competence: perceptions of sport and athletic ability, ability to learn sport skills, and confidence in sports environment; Condition: perceptions of level of physical condition, stamina and fitness; Strength: perceived strength, muscle development, and confidence in situations requiring strength; Physical self-worth: general feelings of happiness, satisfaction, pride, respect, and confidence in the physical self.
PHYSICAL SELF-ESTEEM		
Secord & Jourard 1953, Jourard & Secord 1954	Body Cathexis Scale	The degree of feeling of satisfaction or dissatisfaction with various parts or processes of the body. Five-point scale with 40 items.
Rauste-von Wright 1973, 1981	Body Image Satisfaction Questionnaire BIQ	Adolescent's comprehensions of themselves as physical beings and of the facts that are the most satisfying or dissatisfying in their own existence. Five-point Likert- type rating scale with 17 items.

(Continues)

TABLE 1 (Continues)

Paulus 1982	Acceptance of one's own body and integration with the awareness of the self	Four-point Likert scale with 15 items derived from factor analysis. Items are taken from other scales or developed in this study. The concept of the acceptance of one's own body is theoretically separated from other concepts of physical self-concept.
Franzoi & Shields 1984	Body Esteem Scale	Items from the original Body Cathexis Scale and new items added on the basis of their hypothesized relevance to three major factors for females and males. Five-point Likert scale with 35 items (see also Franzoi & Herzog 1986).
Harter 1988	Perceived Physical Appearance (A subscale of the Self-Perception Profile for Adolescents)	This subscale taps the degree to which an adolescent is happy with the way she/he looks and likes one's body. Includes five items.
Fox & Corbin 1989 Fox 1990	The Physical Self-Perception Profile PSPP Subscale: BODY	A six-item subscale using Harter's question format. The content of the scale is derived from open-ended questions. Perceived attractiveness of figure or physique, ability to maintain an attractive body and confidence in appearance.

Harter's Perceived Competence Scale (1982, 1988) is used widely for measuring self-perceptions in childhood and adolescence. Her scale was devised in order to tap domain-specific judgments of competence in separate domains, as well as global self-esteem, which she calls self-worth. The Perceived Physical Competence subscale provides a profile of the child's perceived competence in the physical domain with items focusing on sports and outdoor games (e.g. item: "First chosen for games"). Harter's scale has several weaknesses. The Perceived Physical Competence scale does not cover the domains of physical fitness and motor abilities, which are essential parts of physical performance capacity (Pitkänen, Komi, Nupponen, Rusko, Telama & Tiainen, 1979; Nupponen, 1981). In addition, perceived physical competence correlates with perceived social competence (Harter, 1982, 1988). Perceived physical and social competence may be related phenomena at school age but there is probably overlap in the content of the items of these two scales.

The rationale for the construction of Harter's scale as well as the other scales in Table 1 has been empirical, so that items have been derived from other scales or from questionnaires or interviews with the subjects. The items have been designed intuitively and have dealt with physical activity and body parts. No theoretical arguments have been expressed to justify item selection. Because of the inadequacy of the existing scales at the beginning of the present study, it

was necessary to compose a new instrument for studying perceived physical competence. Consequently, the Perceived Physical Competence Scale was developed.

Today Fox's (Fox, 1990; Fox & Corbin, 1989) Physical Self-Perception Profile, which was designed for young adults, is a very promising measure. It is multidimensional and includes five subscales. It is also hierarchical so that three levels are represented when the PSPP is used in combination with a global self-esteem instrument. It is suggested that the level of physical self-esteem lies between perceived physical competence and self-esteem.

### **2.3.2 Measuring self-esteem**

Of the numerous measures of self-esteem Rosenberg's scale RSE (1965) is probably nearest to the ideal of unidimensionality. This has been verified in different studies among different age groups (Hoge & McCarthy, 1984). Occasionally, positively and negatively worded items have loaded on two factors. These factors have not, however, demonstrated different discriminant validity. This supports the idea that the RSE represents a single psychological construct (Wylie, 1989, 29). The widely used Harter's scale of Global Self-Worth (1982; 1988) resembles Rosenberg's scale even though it has a different question format. Harter (1985) asserts that her item format tends to control social desirability responding and the tendency to prefer positively worded items. However, the means of self-worth still tend to be above the midpoint of the scale.

Self-esteem and domain-differentiated perceptions of competence are constructs which can first be empirically measured using self-report on the average at the age of eight years and after (Harter 1985, 1990; Rosenberg 1979). At this age children develop the ability to take an outsider's stand to themselves and consciously describe themselves. This happens when children reach Piaget's level of concrete operations.

### 3 DEVELOPMENT OF SELF-PERCEPTIONS IN ADOLESCENCE

Early adolescence is a particularly interesting time to study changes in self-perceptions. First, adolescents must adjust to a changing and maturing body (Petersen, 1987). Secondly, it is a time when new cognitive structures emerge. Information about the self is now processed in a more abstract and differentiated manner (Harter, 1990). Third, early adolescence has been suggested to be a time of gender-role intensification, a time during which males and females adopt more extreme differences in their activities and self-perceptions (Eccles, Wigfield, Flanagan, Miller, Reuman, & Yee, 1989).

Damon and Hart (1988) have presented a theoretical model of cognitive self-understanding development during the years spanning childhood through late adolescence. According to the model, each of the physical, active, social, and psychological modes of construing the self undergoes developmental change throughout the entire period from early childhood to late adolescence. At all ages children have some understanding of their physical, active, social, and psychological selves. Knowledge of each scheme changes slowly and gradually with development, but never to the extent that one scheme disappears or turns into another one. It is the meaning and the importance of these modes, and the organizational relationships between multiple modes, that changes with development.

Empirically it has been shown that beginning on the average from the age of eight children clearly make distinctions between competence domains in the cognitive, social and physical realms (Harter, 1982). By then the child also realizes the discrepancy between one's inner experience and one's outer appearance (Damon & Hart, 1988, 37, 57, 97).

In late childhood (age 8-12) the self is defined in relation to normative physical or social standards. Self-understanding focuses on comparisons between the performances and capabilities of the self versus the performances and capabilities of real or imaged others. Children distinguish themselves in comparative rather than absolute terms (Damon & Hart 1988, 42, 61). In the physical domain perceived physical competence seems to be particularly central

when comparison to others - especially to other children - become important elements of the self. At this age the life of the child expands outside the home, for example coached or organized sports begin to affect the development of many children. Physical characteristics are of great importance when seeking the acceptance of peers, parents, teachers and coaches (Roberts, 1984).

In early adolescence self-understanding focuses on characteristics of the self that determine the nature of one's interaction with others. Categorical identifications with interpersonal implications are emphasized. Physical attributes that influence social appeal and social interactions, especially with agemates, become important elements of the self. (Damon & Hart, 1988, 56, 64-66.)

### **3.1 Studying Change**

When studying change in developmental psychology, the phenomena of continuity - discontinuity are distinct from those of stability - instability. Stage theories hold that all people pass through a series of qualitatively different stages of organization and that the ordering of these stages is invariant. Thus stage theories deal with issues of continuity - discontinuity. Stability - instability issues deal with the differences that arise between people within groups as a consequence of change within the individual. Instability occurs where a person's position relative to his or her reference group (rank ordering) changes with development, whereas stability indicates no change in that position. Continuity (qualitative stability) of the underlying characteristics is a necessary condition for quantitative change (instability) to be observed and measured. (Anderson, 1977; Lerner, 1986, 183-215.)

Self-esteem, perceived physical competence and perceived appearance have been found to be continuous through early adolescence. Such continuity is essential when studying the stability of self-perceptions (Asendorpf & Weinert, 1990, 181). Harter (1988) has demonstrated that the factor structure of perceived competence remains quite the same during early adolescence, thus indicating continuity in cognitive self-perceptions. Alsaker & Olweus (1986) indicated that the items of the Global Self-Evaluation Scale, which is an adaptation of Rosenberg's Scale, were interpreted and responded to in the same way by adolescents aged 11, 12, 13 and 14 years.

### **3.2 Changes and differences in mean levels of self-perceptions**

In studies of developmental change, a major concern is that of age-related changes in the level of an attribute, which are evaluated by examining change in group means over time. Most developmental studies of self-perceptions deal with changes in group mean levels. O'Malley and Bachman (1983) reviewed



several longitudinal studies that had assessed self-esteem using Rosenberg-type scales. The data, including their own study, showed self-esteem to increase with age from 13 to 23. Later studies (Butcher, 1989; Cairns, McWhirter, Duffy & Barry, 1990; Hirsch & Rapkin, 1987; Simmons & Blyth, 1987; Tashakkori, Thompson, Wade, & Valente, 1990; Wade, Thompson, Tashakkori, & Valente, 1989) also indicated an increase in self-esteem with age. Some researchers have, however, found a decrease in self-esteem after transition between schools or because of seasonal change (Eccles & al., 1989; Simmons & Blyth, 1987).

Studies dealing with aspects of self-perceptions other than self-esteem are scarce and contradictory. Eccles & al. (1989) found that perceived physical competence decreased between ages 11 to 12. Alternatively, Nottelman (1987) reported an increase between these same ages. Sarlin (1995, 87-89) has reported a decrease in perceived physical competence from ages 7 to 9. Marsh (1989) suggests, on the basis of his large cross-sectional study and review of the literature, a U-shaped effect during adolescence. There is evidence of decreases in different facets of self-concept during preadolescence. These results imply a curvilinear age effect in which the decline reverses itself during early or middle adolescence. During late adolescence and early adulthood self-concept continues to increase. This overall trend occurs for both sexes and is consistent across different dimensions of self-concept (Marsh, 1989).

The decrease is steepest from the age of 7 to 8 years, evening out at about the age of 11 (Aho, 1987; Sarlin, 1992). The ability to make social comparisons, which develops by the age of 7 or 8, probably affects this decrease in self-perceptions. At about the age of 8 there is a change in cognitive development so that the ability to consciously evaluate the self increases. For example, self-report as an empirical means of measuring self-esteem can first be used at about the age of eight (Harter, 1985; Rosenberg, 1979).

Self-perceptions are most negative in early adolescence. Great physiological and psychological changes take place in early adolescence which probably affect the level of self-perceptions. From about the age of 13-14 years self-esteem and perceptions of competence begin to increase (O'Malley & Bachman, 1983).

An interesting question concerns sex differences in self-perceptions. Wylie (1979) suggested that there was no evidence of sex differences in overall self-concept at any age level. Marsh (1989) has since concluded that there are small sex effects favoring boys for total self-concept measures and for self-esteem measures. There also appear to be sex differences in specific facets of self-concept - some favoring boys, and some favoring girls - that are consistent with sex stereotypes. Boys rate their athletic or physical competence higher than do girls (Biddle, Page, Ashford, Jennings, Brooke, & Fox, 1993; Cairns, McWhirter, Duffy, & Barry, 1990; Felz & Petlichkoff, 1983; Harter, 1988; Marsh, Barnes, Cairns & Tidman, 1984; Nottelman, 1987; Ulrich, 1987). Boys are also more satisfied with their appearance than girls (Biddle, & al., 1993; Clifford, 1971; Harter, 1988; Marsh, 1989; Martin & Walter, 1982; Petersen, 1981; Petersen, Schulenberg, Abramowitz, Offer, & Jarcho, 1984; Rauste von Wright, 1989). On the other hand girls have had higher verbal and academic self-perceptions (Marsh, 1989).

As children enter adolescence do these differences between the sexes increase? Evidence for this gender intensification hypothesis is confusing.

Simmons and Blyth (1987) found some evidence of such a process in a few variables, particularly body-image variables and evaluations of peer popularity. Marsh (1989), however, found that sex differences did not vary with age.

Self-perceptions in the physical domain are also important to adolescents with physical disabilities (Sherrill, Hinson, Gench, Kennedy, & Low, 1990). Children and adolescents with disabilities may experience much failure and incompetence in physical activities (Dunn & Watkinson, 1994; Sherrill, 1993). Little systematic research, however, has been conducted relative to self-perceptions of physical competence in children with physical disabilities. In most of these studies perceived physical competence has been significantly lower for individuals with physical disabilities (King, Shulz, Steel, Gilpin, & Cathers, 1993) than for the able-bodied, especially among girls (Campbell, Hayden, & Davenport, 1977; Magill & Hurlbut, 1986). Sherrill et. al. (1990), however, reported no difference between perceived physical competence scores of adolescent athletes with physical disabilities and those of able-bodied peers.

### 3.3 Stability of self-perceptions

An additional developmental question concerns the longitudinal stability of interindividual differences. Stability indices indicate changes in a person's position relative to his or her reference group. It should be noted that considerable stability is possible in the relative ranking of individuals even in the presence of substantial changes in means. Stability is usually indexed by test-retest correlation. Alternatively stability can be defined as the correlation between latent (true) variables corrected for measurement error at different time-points.

Until now, the only study in which reliability and true score stability have been studied simultaneously at multiple time-points is that of O'Malley and Bachman (1983). They assessed self-esteem on three occasions during later adolescence at the ages of 15, 16, and 18. The reliabilities proved to be high (0.75 - 0.80) and the stabilities considerable (0.61 - 0.82). Males and females were combined in the analyses in this study.

Alsaker and Olweus (1992) have reviewed studies of the stability of self-esteem in adolescence, using the Rosenberg Self-Esteem scale and instruments that are adaptations of the Rosenberg scale. The studies they reviewed, as well as their own cohort longitudinal study, indicate that global self-esteem remains a fairly stable dimension for short intervals (up to one year) and thereafter the stability of self-esteem declines rapidly (a two-and-a-half year follow-up study). They found no differences in stabilities between males and females for time intervals up to 1 year. Their results, however, indicated a somewhat stronger decrease in the stability coefficients for females than for males over an increasing time interval of up to two and a half years. At the same time, they also found a gradual increase in stability coefficients with age. There was some indication that this increase may be greater for males than for females.

High stabilities in the self-esteem of adolescents may indicate the early emergence of a substantially fixed evaluation of a person's own worth. On the other hand, Alsaker and Olweus (1992) concluded that self-esteem is likely to become more firmly fixed or crystallized with increasing age. They introduced the gradual consolidation hypothesis, which implies that later experiences have a relatively decremental impact on self-esteem under ordinary conditions. However, they included only a limited set of time intervals in their study and suggest that extrapolations beyond this range should be made with caution. There is a need for longitudinal studies of long duration, with multiple measurements and examinations of gender differences. In accordance with the hypothesis of Alsaker and Olweus, the stability coefficients were expected to increase with age in the present study where children were being studied for a longer period.

Follow-up studies dealing with the stability of aspects of self-perceptions other than self-esteem are rare. In one of the few studies, Eccles & al. (1989) found correlations in perceived physical skills to be from 0.63 to 0.79 from the age of 11 to 12 years. Boys had more stable perceptions of physical skills than girls. Otherwise there was no consistent evidence of sex differences in individual stabilities in self-concept in the domains of mathematics, mother tongue, and social abilities. On the other hand Nottelman (1987) found no differences between the sexes in perceived physical competence in a follow-up study of 11- to 12-year-old children. The correlation between these measurements was 0.74.

## **4 SELF-PERCEPTIONS AND EXERCISE INVOLVEMENT**

### **4.1 Change, selection and exercise**

Positive emotional and psychological benefits are commonly believed to result from physical exercise. Self-esteem has been identified as the variable with the greatest potential to reflect the possible psychological benefit to be gained from regular exercise (Folkins & Sime, 1981; Fox, 1991; Hughes, 1984; Sonstroem, Harlow, Gemma & Osborne, 1991). There are two models, which deal with the relationship between physical activity and psychological well-being - the change model and the selection model (Bakker, Whiting, & van den Brug, 1990, 60-62; Cratty 1989, 46; Kirjonen & Telama, 1984).

Firstly, it is possible that changes in the personality become apparent as a consequence of exercise. Sonstroem and Morgan (1989) have proposed a model for examining mechanisms of self-esteem change through exercise. They hypothesize that participation in sport may initially increase task-specific feelings of self-efficacy. An increase in self-efficacy may generalize to perceptions of physical competence, which in turn can increase more general self-esteem. It is supposed that self-perceptions are hierarchically organized on a dimension of generality. At lower levels self-perceptions are more situation-specific and will develop a greater correspondence with situation-specific criteria than will global self-esteem (Shavelson, Hubner, & Stanton, 1976). Situation-specific conceptions of self-efficacy and perceived competence are more susceptible to influence from the environment, such as for example, exercise. The amount of importance an individual attaches to different competencies may also have significance in describing individual differences in self-esteem content and structure (Fox, 1990; Harter, 1986b; Ommundsen & Vaglum, 1991).

The selection model on the other hand suggests that those who already have a high perception of their physical abilities are more likely to engage in sport and persist at participation. In this connection both Harter's (1978) Model of Competence Motivation and Sonstroem's (1978) sport-specific Psychological Model for Physical Activity predict that individuals (e.g. young athletes) who perceive themselves to be highly competent will persist longer at the activity in question.

Change effects have most often been studied by interventions designed to enhance physical activity in relation to randomly assigned control groups. Meta-analyses indicate that participation in exercise programs is associated with improved self-perceptions in childhood (Gruber, 1986), adolescence (Calfas & Taylor, 1994), and adulthood (McAuley, 1994). McAuley, however, concludes that the robustness of this relationship between physical activity and positive self-perceptions is questionable because of methodological and design problems. Sonstroem (1984) also concluded that the methodological problems of the majority of studies prevent unequivocal conclusions, although the results do point towards the positive effects of exercise on self-esteem scores. The real effects of exercise on psychological well-being are hard to study experimentally because of the practical impossibility in exercise studies of using a placebo group (Kemper, 1994; Ojanen, 1994).

It is possible, however, to avoid some of the problems of experimental studies and to bolster both the change and selection models by following the natural history of habitual physical activity in children longitudinally and to grouping individuals afterwards according to registered activity patterns (Kemper, 1994; Mednick, 1981). We are not aware of any long-term follow-up research with several measurements on the natural history of physical activity and self-perceptions. Neither has actual physical performance been taken into account at the same time as perceptions of physical competence.

## **4.2 Relationships between exercise involvement and self-perceptions**

The main motivational theories have consistently featured self-perceptions in a key role (Atkinson, 1966; Bandura, 1977; Harter, 1978; White, 1959). In general, a belief in one's ability creates expectations of success, which in turn directs choice and persistence in behaviour. Given the opportunity, those behaviors are sought that provide a sense of competence, and those avoided that carry a high probability of failure.

In physical domain Sonstroem (1974, 1976, 1978; Neale, & al., 1969) developed the Psychological Model of Physical Activity, which yields the relationships between exercise, physical ability, perceived competence and self-esteem. According to the model, perception of physical competence is a mediating factor between objective physical ability and self-esteem. In addition, positive perceptions of physical competence lead to a more positive attitude towards activity, which in turn leads to higher levels of voluntary involvement in physical activity. This high level of activity may lead to improved ability,

followed by improved perceptions of competence and self-esteem. Conversely, low perceptions of competence can lead to a negative attitude and an avoidance of physical activity. Sonstroem and Morgan (1989) have since further specified the part of the model that deals with the relationship between perceptions of physical competence and self-esteem by incorporating the concept of self-efficacy into the model.

Studies among adolescents (Feltz & Petlichkoff, 1983; Roberts, Kleiber, & Duda, 1981; Weiss, Bredemeier, & Shewchuk, 1984) have demonstrated an association between perceived athletic competence and involvement in sports. Further work (Fox, Corbin, & Couldry, 1985) has supported this positive relationship in college age students. Causal evidence is not yet available, but the association between perceived physical competence and involvement in sports suggests that the competence motive operates with adolescents in the physical domain. Sonstroem's model has generated a number of correlational and short term experimental studies, but very little developmentally oriented research.

## **5 FRAMEWORK AND AIMS OF THE STUDY**

### **5.1 Framework of the study**

The framework of the study has been adapted from Sonstroem's (1976, 1978; Neale, & al., 1969) Psychological Model of Physical Activity, which describes the relationships between exercise, physical ability, perceived physical competence and self-esteem (Figure 1). The purpose of the present study is to study both the relationships between and the development of variables in the model. Results of biological maturation are left outside of the present study and reported earlier (Lintunen, Rahkila, Silvennoinen & Österback, 1988; Rahkila, Lintunen, Silvennoinen & Österback, 1988).

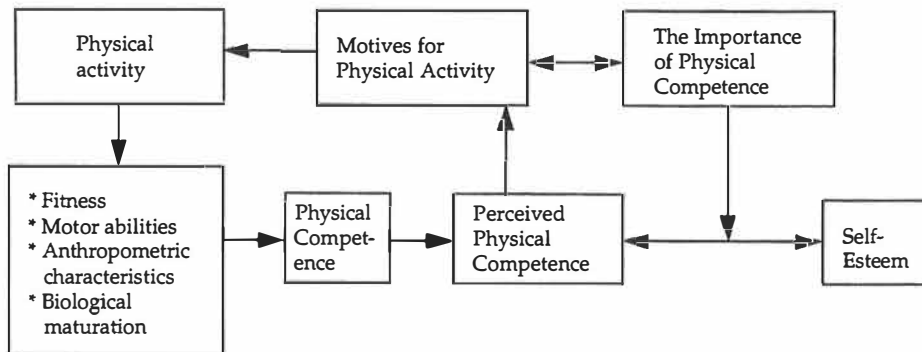


FIGURE 1 A schematic presentation of the relationships between the psychological and physiological characteristics studied (adapted from Sonstroem, 1978). The arrows describe the hypothetical direction of causality or the relationship

## 5.2 Aims of the study

The purpose of this thesis was to study the development of self-perceptions by studying both the changes in the mean levels across time (profile analysis) and the changes in the reliability and stability of individual differences (i.e. stability as test-retest correlations). Because no adequate measure for studying perceived physical competence was available at the beginning of the study, it was necessary to devise such an instrument and test its reliability, stability and validity. The outcome was the Perceived Physical Competence Scale.

Another purpose of the present project was to study the possible psychological benefit to be gained from regular exercise. The task was to follow the natural history of habitual physical activity in early adolescence longitudinally and to study both the change and selection effects of exercise on self-esteem and perceived fitness. In addition, the present study tests Sonstroem's (1978) hypothesis that perceptions of physical fitness may be a mediating variable between physical fitness and self-esteem.



More specifically, the aims were:

- 1) To devise an instrument which would provide a profile of perceived physical competence in late childhood and early adolescence (I, II, III).
- 2) To study change and stability in self-perceptions in early adolescence (III).

Hypotheses:

- 2.1 The gradual consolidation hypothesis: self-esteem becomes more fixed with age.
- 2.2 Differences between girls and boys either arise or increase from the age of 11 to the age of 15 (gender intensification hypothesis).
  - 2.2.1 Boys have higher self-esteem than girls.
  - 2.2.2 Boys have a higher perception of their fitness and appearance than girls.
- 3) To study the hypothetical change and selection effects on self-perceptions, physical fitness, and anthropometric characteristics by monitoring adolescents and their physical activity over four years with annual measurements (IV).
- 4) To test Sonstroem's (1978) hypothesis of the relationships between physiological characteristics, self-perceptions of these characteristics and self-esteem during the four-year follow-up period.

Hypothesis:

- 4.1 Physical fitness explains perceptions of fitness.
- 4.2 Physical fitness does not explain self-esteem.
- 4.3 A positive correlation exists between perceived fitness and self-esteem.
- 4.4 An association exists between perceived athletic competence and involvement in sports.

## 6 METHODS

### 6.1 Participants of the follow-up study

The study was implemented as part of the larger longitudinal multidisciplinary research project Children and Sport (Lintunen & al. 1984). Altogether the study took five years. In order to recruit physically active children, sport clubs were approached in autumn 1982. The sample of sedentary children were drawn from students at the local elementary school and at the school of music. The sample was discretionary with the aim of forming high contrast groups based on the level of physical activity. The children were healthy volunteers living in central Finland in the city of Jyväskylä. The number of children who participated in the study in its different phases is presented in Table 2.

TABLE 2 Number of the child participants

	Age (years) at measurement						
	10	11	12	13	14	15	11-15 <sup>1)</sup>
Girls	45	62	59	57	57	54	49
Boys	73	80	77	68	66	71	64
Total	118	142	136	125	123	125	113

<sup>1)</sup> The number of subjects in age groups 11-15 participating in all five measurements

The original sample (n=118) consisted of 10-year-old girls (n=45) and boys (n=73) (mean age 10.0 years, SD 1.1). One girl and 39 boys belonged to an ice hockey club, 13 girls and 10 boys to an apparatus gymnastics club, and 18 girls and 9 boys to a swimming club. The athletes had been involved in sports on average one year. Of the original sample 13 girls and 15 boys did not participate in organized sports at all. Those participating in the first measurement served

as subjects when validating the Perceived Physical Competence Scale (I). During the second autumn (age 11) an additional sedentary group was invited to the study. These girls (n=17) and boys (n=7) attended the school of music and regarded music as their main interest.

142 adolescents aged 11 (original sample and musicians) participated in the study; 113 of these (80%) filled in all the questionnaires during the successive four follow-up years. Attrition was due to refusal to participate (n=10), refusal to participate in one or more measurements and thus creating lacunae in the data (n=9), moving away from the district (n=9), and death (n=1). Complete data for both the fitness measurements and psychological scales were obtained for 88 adolescents (except the test for maximum oxygen consumption, in which n=79). Those who refused to participate in the fitness measurements experienced them as too strenuous. Most of these subjects belonged to the sedentary group. In addition, three of our subjects were too short during the first years to pedal the ergometer.

To check for the selective retention of our subjects, those with incomplete data (n=54) after the first year were compared to the final sample (n=88) with complete data for both the psychological and physiological measurements for four years. Those with incomplete data were less physically active than those with complete data at the beginning of the follow-up period (two-way analysis of variance: main effects of physical activity,  $p = 0.025$ , sex,  $p = 0.005$ , and interaction of physical activity and sex,  $p = 0.512$ ). No significant differences were observed in the measures of self-perceptions, physical fitness or anthropometric characteristics between the drop-outs and the follow-up group. The overall recovery of the data was acceptable during the follow-up period and permits conclusions to be drawn.

The socio-economic status of the parents of our participants as regards profession, education and income was slightly above the average of the total Finnish population (Silvennoinen, Lintunen, Rahkila & Österback, 1984).

### **6.1.1 Classification of the participants according to exercise activity**

Because most of the children participated in more than one sports event and because they also changed their main sports interest, dropped out and restarted, it was necessary to measure overall exercise activity with standardized means describing the total time spent on organized sports (for details of sports participation, see Moberg, 1990 and Jaatinen, 1985). The level of exercise activity during the follow-up period was studied using an activity interview with the adolescents developed for this study. The interview was conducted every half year, providing information on the exact amount of time (minutes) spent weekly during the previous six months on supervised physical activity outside school hours (the amount of school physical education was the same - two hours twice a week - for all the students and hence not included here). The activity interview has been found to be a reliable means of studying habitual physical activity (Kemper, 1994; Sallis, 1991). To validate the interview, coaches belonging to the sports clubs were also interviewed regarding our subjects' participation in the club's activities. The information given by the adolescents

and the coaches was consistent.

After the follow-up period the participants were divided into sedentary (15 boys, 20 girls), physically active (20 boys, 10 girls), and physically very active (15 boys, 8 girls) groups. The classification was made according to both the duration and the continuity of physical activity. Participants were rated as *sedentary* if they had participated in supervised training for less than 2 hours / week during at least three of the four follow-up years. They were rated as *active* if they had had 2-5 hours / week supervised training during at least three of the four follow-up years and as *very active* if they had had 5 hours or more supervised training / week during at least three of the four follow-up years. All the participants were classifiable according to these criteria. The level of activity proved to be very stable during the follow-up period.

## 6.2 Additional participants in the validation of the Perceived Physical Competence Scale

The results for perceived physical competence in the present follow-up study were compared with those of a representative sample of adolescents from central Finland (Holopainen, 1990; Holopainen, Lintunen & Lumiaho-Häkkinen, 1987) in order to study the discriminant validity of the scale and to obtain norm references. The sample consisted of 116 girls and 116 boys. Ages ranged from 13 to 16 years. (II)

Eighty-five adolescents with disabilities also served as participants in the discriminant validation of the Perceived Physical Competence scale. Ages ranged from 13 to 18 years. The gender distribution was 51 girls and 34 boys. The subjects were all students with disabilities identified by teachers using the Awareness of Individual Differences Survey in one region of Finland (Heikinaro-Johansson & Sherrill, 1994). Disabilities included orthopedic conditions, e.g., cerebral palsy, leg or back problems, and various health impairments, e.g., cardiovascular disease, rheumatism, diabetes, and asthma. (II)

The results for the active and very active groups of the present study were compared with the results for 10-18-year-old athletes (704 girls and 563 boys) who participated in the Winter Sports Games in Jyväskylä 1985 (Lintunen, Rahkila, Silvennoinen, Viitasalo, & Österback, 1989; Lintunen & Rahkila, 1989).

Two-week test-retest measurements were performed among 21 11-year-old Finnish female gymnasts and 15 9-year-old male ice hockey players. (I)

### **6.3 Procedure**

Prior to participation, an informed consent was obtained from the participants and their parents. After school hours a battery of questionnaires, interviews, fitness tests, and growth measurements were administered individually. The measurements took place annually at the research center during the autumn, at the same point in each semester. The activity interview was conducted twice a year. The investigator with one assistant administered the activity interview and self-perception questionnaire to each adolescent individually and was available for questions and assistance. Each participant was interviewed separately with no one within hearing range. All the interviews were audiotaped with the permission of the respondent. The subjects were free to withdraw from the study at any time if they so desired. Efforts were made to diminish subject fatigue after school hours. For example, the children were offered fruit juice and sandwiches. The participants were provided with small gifts (for example swimming pool tickets and stickers) as incentives to participate.

### **6.4 Statistical methods**

The statistical significance of the differences between means was analyzed by Student's t-test or one-way analysis of variance following by modified LSD multiple comparison test. Two-way analysis of variance was used to compare the means between groups formed on the basis of two independent variables. Internal consistency of the self-perception scales was studied by Cronbach's alpha. Exploratory and confirmatory factor analyses were performed to investigate the factor structure of the Perceived Physical Competence Scale. MANOVA-models were used in the profile analysis (SPSS, 1990). Lisrel-models were used to analyze the relationships between perceived and measured fitness. Simplex-models were used in evaluating the reliabilities of the measurements and the stability of the self-perceptions. The models were estimated and tested with the LISREL programs (Jöreskog & Sörbom, 1989, 1993).

### **6.5 Instrumentation**

The perceived fitness, perceived appearance, perceived importance of fitness and perceived importance of appearance were measured by self-report scales designed for this study.

### 6.5.1 Construction of the Perceived Physical Competence Scale

This scale was based on the Perceived Performance Capacity Model of Pitkänen, Komi, Nupponen, Rusko, Telama, and Tiainen (1979; Nupponen, 1981), who posited aerobic endurance, anaerobic endurance and power, muscle strength, body elasticity, control of muscles, regulation of timing, and sensorimotor control as the most salient components of physical performance capacity. The model underlying the selection of the items on this scale guarantees that it covers a wide area of physical capacities. Most scales are composed of items derived from other scales or from interviews with the subjects. This scale is short and takes little time to complete. The items are not specific to any sports event. The conceptual level is suitable for children over 10 years of age.

In the present study perceived physical competence refers to how good a child rates his/her physique (physical entity or physical constitution) as compared with that of other children of the same age and sex. Physique comprises general physical fitness, motor fitness, motor ability, physical resources (anthropometric characteristics and other physical attributes) together with the regulating psychic system, according to the model of physical performance capacity (Pitkänen et al. 1979). Furthermore, it was assumed that those factors associated with appearance are also important elements of perceived physical competence (Shavelson & al. 1976; Shavelson & Bolus 1982).

From the model of physical performance capacity the following referents were chosen as the stimuli which a 10-year-old child was considered to be able to understand and evaluate. Endurance and strength were chosen to represent general physical fitness; strength, athletic abilities, agility, flexibility and speed to represent motor fitness and motor ability; height and fatness/leanness to represent physical resources; and courage to represent the psychic system. General appearance, height and fatness/leanness were, in addition, chosen to represent appearance. The items were neither mutually exclusive nor necessarily exhaustive. They were chosen so that it was possible to obtain reference data for some of the characteristics by means of laboratory measurements.

The scale is comprised of ten bipolar items, seven on perceived fitness and three on perceived appearance. Participants were asked to rate themselves on specific components compared with those of other students of the same age and gender. Responses to items were scored on a 5-point Osgood semantic differential scale, on which 1 indicated a low level and 5 indicated a high level; for example,

I am slow ( ) (x) ( ) ( ) ( ) I am fast

The specific components of perceived physical fitness were movement skills, agility, flexibility, endurance, speed, strength, and courage. The subscale score was derived by summing the responses to these seven items. The minimum score was 7 and the maximum score was 35.

The specific components of perceived appearance were height, weight, and satisfaction with appearance. Items "weight" and "height" were graded 1-2-5-2-1 and the item "appearance" was graded 1-2-3-4-5 when the sum index of the appearance scale was formed. The minimum score was 3 and the maximum score was 15. The scale is presented in Appendix 1.

### 6.5.2 Factor structure of the Perceived Physical Competence Scale

Factor analysis was used to determine the possible multidimensionality of the scale. Shavelson et al. (1976) and Shavelson & Bolus (1982) have proposed a two-factor structure for perceived physical competence.

The two-sub-index (perceived fitness and perceived appearance) solution was chosen (I). The four-factor pattern could also have been possible for the girls. Comparison of the boys and girls was considered an important question and was enabled by the two-factor solution. In addition, the findings for adolescents with disabilities supported the two-factor structure. However, the item "appearance" was left away from the scale of adolescents with disabilities and the sum-index was named Perceived Body Build. (II)

Confirmatory factor analysis was used to study the unidimensionality of perceived fitness during the follow-up period. The factor of perceived fitness was found to be tenable and stable during four-year follow-up both among the girls and the boys (Figures 2 and 3). The one-factor model of perceived fitness showed a satisfactory fit with the data (Jöreskog & Sörbom, 1993). However, some covariances between the residual terms were estimated with the aim of attaining a clear structure and better goodness of fit.

Perceived appearance was not a consistent factor (I) (II). It was interesting, however, from the longitudinal perspective to study the stability and reliability of perceived appearance, and therefore the sum index was used. The results must be interpreted with caution.

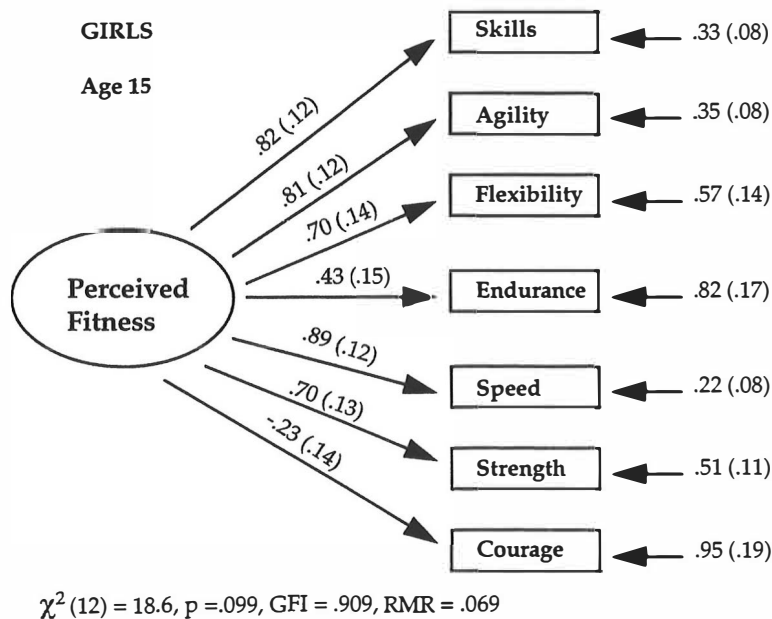
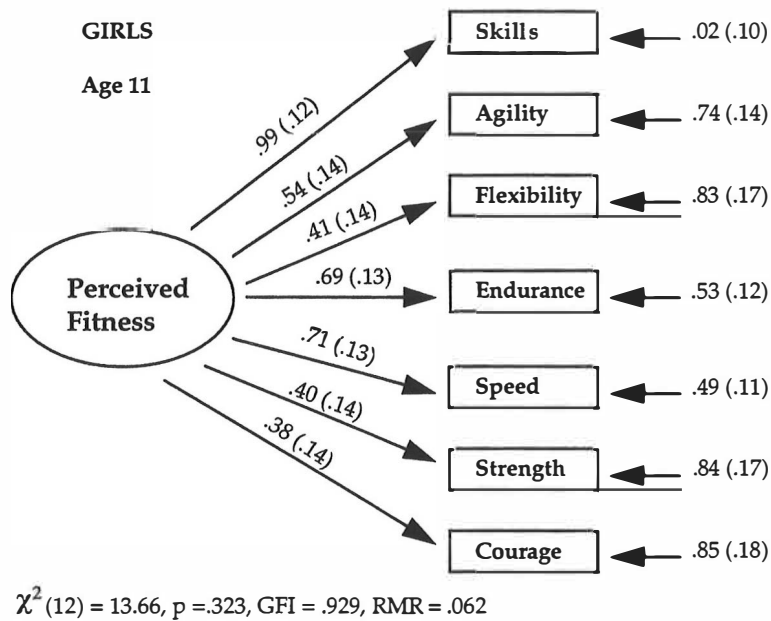
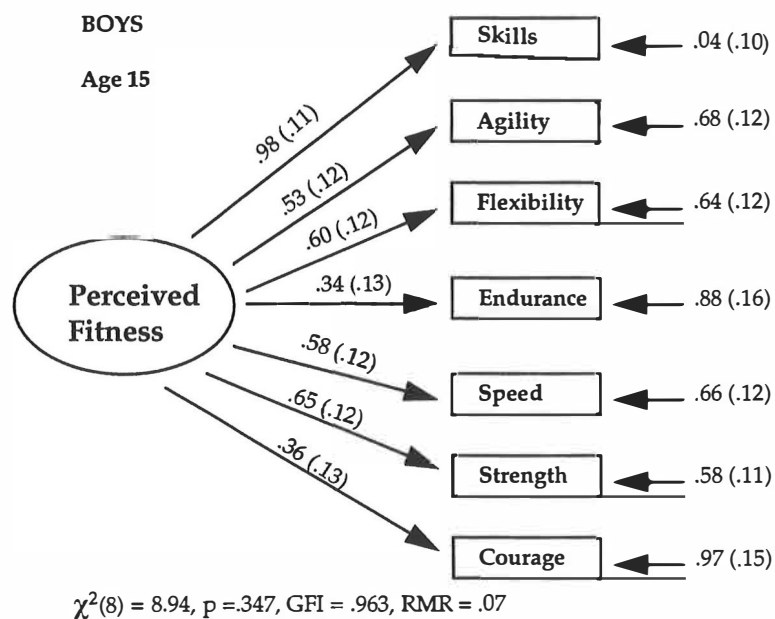
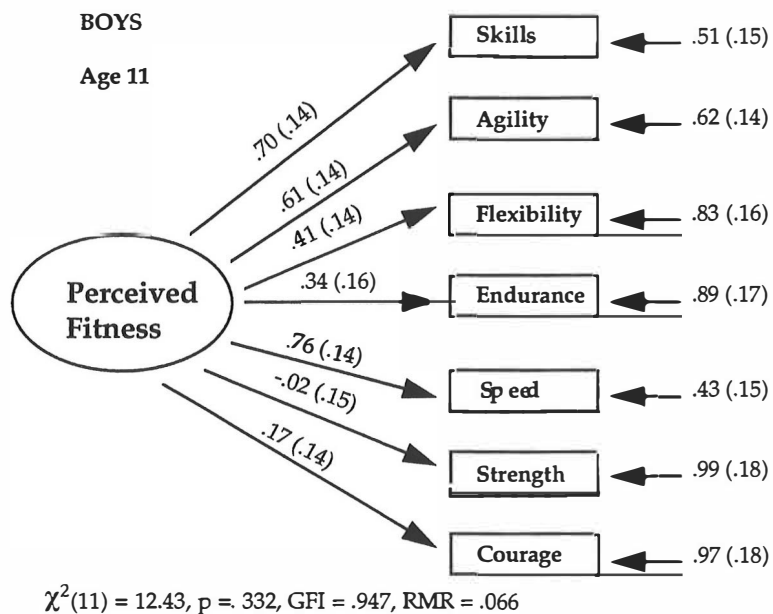


FIGURE 2 Results of the confirmatory factor analysis. The factor of perceived fitness of the girls ( $n=49$ ) at the ages of 11 and 15 years (standard errors in parenthesis)





**FIGURE 3** Results of the confirmatory factor analysis. The factor of perceived fitness of the boys ( $n=64$ ) at the ages of 11 and 15 years (standard errors in parenthesis)

Internal consistency was addressed for each of the subscales using Cronbach's alpha. The alpha coefficients for perceived fitness were acceptable both for the follow-up participants (Table 3) and for the adolescents with disabilities (alpha = 0.89) and comparable to those of self-esteem. The low number of items on the Perceived Appearance Scale and vague factor structure led to low alpha values. The alpha coefficients of perceived importance of fitness and appearance (see Chapter 7.5.5) instead were both surprisingly high (Table 3).

TABLE 3 Alpha coefficients for perceived fitness, perceived appearance, self-esteem, perceived importance of fitness and perceived importance of appearance (girls n = 49, boys n = 64)

Age (years)	Perceived Fitness		Perceived Appearance		Self-Esteem		Importance of fitness		Importance of appearance	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
11	0.78	0.62	0.16	0.42	-	-	0.80	0.77	0.89	0.85
12	0.57	0.76	0.63	0.51	0.75	0.85	0.84	0.80	0.86	0.90
13	0.72	0.76	0.46	0.29	0.83	0.79	0.83	0.84	0.86	0.92
14	0.75	0.77	0.22	0.24	0.84	0.81	0.85	0.89	0.88	0.89
15	0.73	0.77	0.12	0.33	0.80	0.81	0.82	0.90	0.86	0.87

### 6.5.3 Reliability of the Perceived Physical Competence Scale

Simplex models were used in evaluating the reliabilities of the measurements (III). Coefficients of internal consistency (Cronbach's alpha) have sometimes been recommended to correct raw correlations (see Alsaker and Olweus 1992). The estimation of stability is, however, statistically more efficient using Simplex models. They enable the study of changes in stability both over time-points and between different groups.

The reliability coefficients for perceived fitness among the boys were high (0.78, 0.84, 0.81, 0.90, 0.91, respectively between the successive time-points from the ages of 11 to 15). Among the girls the estimates of the measurement error variances were close to zero, so that the reliability coefficients of perceived fitness were close to 1 and could thus be fixed at 1. This result indicates that the reliability of the perceived fitness sum index among the girls was very high. The estimated coefficients of reliability for perceived appearance among the boys were moderate (0.70, 0.71, 0.79, 0.51, 0.42) and among the girls high and could be fixed at 1. The reliabilities for self-esteem among the boys were 0.83, 0.76, 0.75, 0.75 and among the girls 0.78, 0.81, 0.82, 0.80, respectively, indicating high reliability.

#### 6.5.4 Validity of the Perceived Physical Competence Scale

The content validity of the Perceived Physical Competence scale was aimed for by selecting the items that compose the Perceived Fitness scale, according to the model of physical performance capacity (Pitkänen & al., 1979). The model enabled the broad inclusion of physical characteristics. Furthermore, it was assumed that perceptions of appearance are also important elements of perceived physical competence (Shavelson & Bolus, 1982). Items in other existing scales either have been designed intuitively or derived from the interviews with the subjects. The items of the perceived fitness scale were chosen so that it was possible to obtain reference data for some of the characteristics from the laboratory measurements.

The construct validity of the scale was supported by the positive correlations between the sub-indices of the Perceived Physical Competence Scale and Self-Esteem scale (I, III). This finding is in agreement with earlier ones (Fox, 1990; Harter, 1988; Heaps, 1978; Leonardson & Gargiulo, 1978; Neale & al., 1969; Zion, 1965). Among the girls this correlation emerged only between self-esteem and perceived appearance. This result is in agreement with the notion that physical competence is not as important a source of self-esteem for girls as it is for boys. Among the boys both perceived appearance and perceived fitness were associated with self-esteem. The construct validity of the scale is also supported by the negative correlations between the sub-indices of Perceived Physical Competence and Sport Competition Anxiety among the boys (I). According to Harter's (1978) effectance model these constructs are negatively associated. Earlier studies have also indicated perceived physical competence (Ryckman & al., 1982) and body-esteem (Furst & Tennenbaum, 1984; Goldberg & Folkins, 1974; Johnsson, 1956; Secord & Jourard, 1953) as having a negative correlation with anxiety.

A multitrait-multimethod design with a confirmatory factor analysis approach was used to test the construct validity of perceived fitness (Kauppi, 1993). The measures of self-perceptions were the scale of Perceived Fitness, Harter's Perceived Physical Competence scale, Harter's Self-Worth, Rosenberg's Self-Esteem, Marten's Sport Competition Anxiety and Olweus' Social Anxiety. Three correlating trait factors were found (perceived physical competence, self-esteem and anxiety). Concurrent validity was supported, as the correlations between the same characteristic measured by different methods were higher than the correlations between different characteristics measured by same methods. For example, the correlation between Harter's Perceived Physical Competence and Perceived Fitness scale of the present study was 0.58 (n=99) at the age of 15 years.

The criterion validity of the scale is supported by the estimations of athletic abilities, agility and speed, which correlated moderately with the tests of squat jump, counter movement jump and power in the 15-s jumping test at the age of 10 (I). During the follow-up period the latent factor of physical fitness explained the very high respective percentages (31%, 43% and 66%) of the variance in perceived fitness among the girls at the ages of 11, 13, and 15 years. Groups differing in satisfaction with height and weight differed also in measured height, weight and the sum of four skinfolds.

Discriminant validity is supported by the result that the physically active groups had a higher perception of their fitness than either the sedentary groups (IV) or students with disabilities (II). The perceived fitness scores of the active groups were at the same level as those of young athletes participating in the Winter Games in Jyväskylä (Lintunen & Rahkila, 1989; Lintunen, Rahkila, Silvennoinen, Viitasalo, & Österback, 1989). Discriminant validity is supported by the result that at the age of 9 -10 the boys of the present study with advanced biological maturation perceived their fitness higher than the boys with delayed maturation (Lintunen, Rahkila, Silvennoinen, & Österback, 1988).

It was attempted to control the possible tendency of the subjects to give socially desirable responses by the emphasis in the instructions that there were no right or wrong answers, and that the responses were strictly confidential. If similar scales were to be used, for example, in entrance examinations, the answers might be biased, especially among older participants. According to Bandura (1986), if a person has no reason to distort his or her responses, self-evaluations represent well the person's cognitions. The theoretically justified correlations between the perceived physical competence scale and other variables, and its discriminant and criterion validity suggest that socially desirable responding was not a significant factor.

#### **6.5.5 Perceived Importance Scale**

The Perceived Importance of Fitness (PIF) and Perceived Importance of Appearance (PIA) scales were developed concurrently with the Perceived Physical Competence scale (see Appendix 1). In both cases assessments were made using a self-report questionnaire. The children were asked how important they thought it was to possess various fitness or appearance characteristics. They were asked to evaluate in the same order the same characteristics which were used in the scale of Perceived Physical Competence. The format of the items was: "really - somewhat - not at all important". Responses were scored on a 3-point Osgood scale, on which 1 indicated low importance and 3 high importance. The sum indices were named Perceived Importance of Physical Fitness (the minimum value of the sum index was 7 and maximum 21) and Perceived Importance of Appearance (minimum value 5 and maximum 15). The scale is presented in Appendix 2. The internal consistency of these two subscales is high (Table 3), even higher than that of self-esteem.

#### **6.5.6 Other measures used in the study**

Self-esteem was assessed using a modification of the Rosenberg (1965) Self-Esteem scale with 8 of the original 10 items. Two items were omitted, because many subjects understood them differently than intended by the test designer. The items did not discriminate the subjects, because the distributions were skewed. The omitted items were: "I feel I do not have much to be proud of" and "I wish I could have more respect for myself". The subjects comment on these items using expressions like "I am not proud or uppish". The word "proud" has a very negative meaning among the children. This finding probably

mirrors cultural differences between Finland and the United States, where Rosenberg designed his scale.

The items of the self-esteem scale were dichotomous at the age of 11. Beginning from age 12, the four-point Likert scale was used (the minimum value of the sum index was 8 and maximum 32). Rosenberg's scale has been found to have high reliability and to yield relationships supporting its construct validity (Hoge & McCarthy, 1984; Rosenberg, 1985).

The measure of anxiety was the Sport Competition Anxiety Test (Martens, 1977; Martens, Vealey, & Burton, 1990). This scale was used when assessing the construct validity of the Perceived Physical Competence scale.

The anthropometric measures taken were weight and height and the sum of the thickness of skinfolds at four sites (subscapular, triceps, biceps, suprailiacae).

Several measures of physical fitness were used. Maximum oxygen uptake ( $\dot{V}O_2$  max) was measured during a continuous stepwise bicycle ergometer exercise using an open-circuit method. Maximum isometric grip strength of the dominant hand was measured using a specially designed dynamometer (Heikkinen, & al. 1984). A jumping test introduced by Bosco, Luhtanen, and Komi (1982) was used to measure the power of the leg muscles during a series of rebound jumps for 15 seconds. During the follow-up period all the measurements were performed by the same investigators in the same laboratory with the same equipment.

## 7 RESULTS

### 7.1 Change and stability in self-perceptions

#### 7.1.1 Perceived Fitness

The means and standard deviations indicated that, on average, the boys and girls scored above the neutral value of 21 (the mid-point) and thus perceived their fitness positively (Figure 4). Perceived fitness did not differ between the sexes during the follow-up.

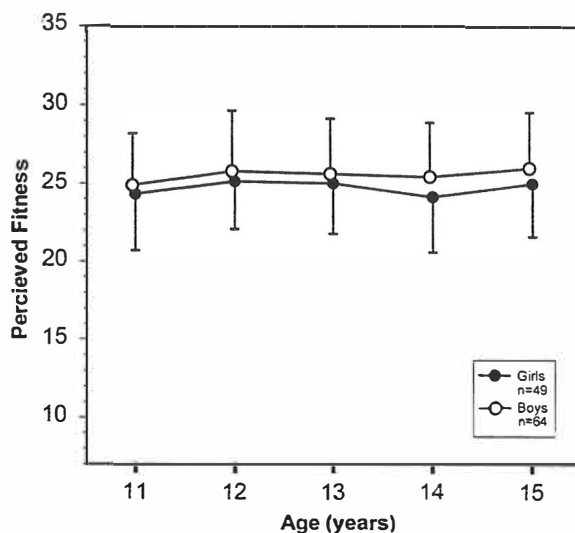


FIGURE 4 Perceived fitness: means, standard deviations and changes with age in boys and girls

The MANOVA-models (III) indicated that the overall effect of age was statistically significant ( $p = 0.001$ ), with increases in perceived fitness observed from ages 11 to 12 ( $p = 0.001$ ) and 14 to 15 ( $p = 0.008$ ).

The Simplex-models provided a very good fit. The estimated coefficients of stability among the boys were high (0.86, 0.79, 0.97, and 0.87). This indicates that the ranking of the subjects along the scale of perceived fitness remained unchanged during the follow-up. The stabilities of the girls (0.67, 0.71, 0.80, and 0.82) were somewhat lower than those of the boys (III).

### 7.1.2 Perceived Appearance

At the beginning of the study the 11-year-old boys and girls perceived their appearance positively (Figure 5). The perceived appearance of the girls thereafter decreased and that of the boys increased, thus indicating an interaction between sex and age ( $p = 0.056$ ). The girls showed a significantly lower perceived appearance than the boys at ages 13, 14, and 15 ( $p = 0.046$ ,  $p = 0.002$  and  $p = 0.000$ ). There were, however, no differences in means between the successive time-points.

The Simplex-models showed a very good fit. Perceived appearance among the boys was very stable (0.94, 0.93, 0.84, and 0.98). Among the girls the stabilities were rather low (0.36, 0.44, 0.59, and 0.45). (III)

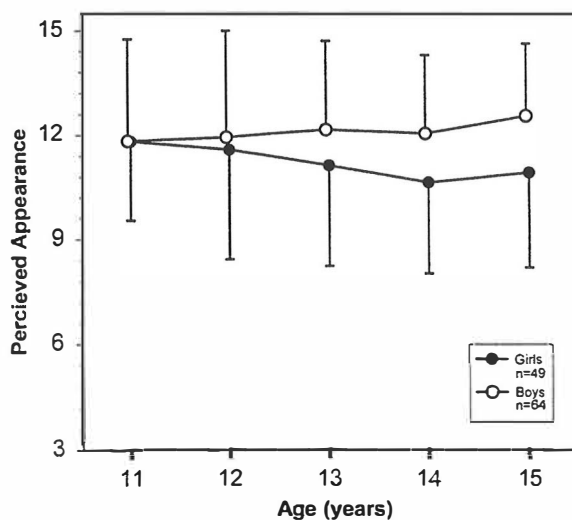


FIGURE 5 Perceived Appearance; means, standard deviations and changes with age in boys and girls

### 7.1.3 Self-Esteem

The means for self-esteem were clearly above the neutral mid-point value of 20 and thus indicated positive self-esteem (Figure 6). The girls showed, however, statistically significantly lower self-esteem than the boys at ages 12, 13, and 15 ( $p = 0.031$ ,  $p = 0.004$ , and  $p = 0.001$ , respectively). Self-esteem among the boys increased from age 14 to 15 ( $p = 0.006$ ) and among the girls from age 13 to 14 ( $p = 0.019$ ). No significant interaction between sex and age was present. The Simplex-models showed a very good fit. Self-esteem among the boys was stable (0.77, 0.93, and 0.93). The values of the stabilities of the girls were 0.77, 0.80, and 0.88. (III)

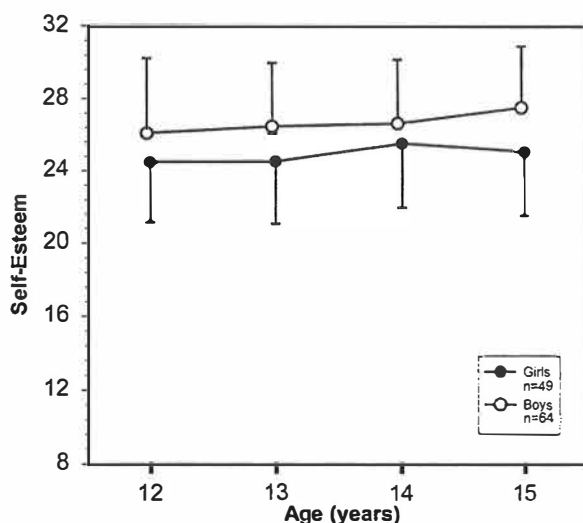


FIGURE 6 Self-Esteem: means, standard deviations and changes with age in boys and girls

## 7.2 Exercise and self-perceptions in three activity groups

The findings for **perceived fitness** among the **girls** are in line with the change model (IV). While no differences in perceived fitness were found at the beginning of the follow-up period at age 11 between the sedentary, active and very active groups, during the subsequent years the two physically active groups of girls had a higher perception of their fitness than the sedentary girls (Figure 7). The findings for **perceived fitness** among the **boys** are in line with the selection model. The two physically active groups of boys already had higher perceptions of their fitness than the sedentary group at the beginning and this difference was maintained throughout the follow-up (Figure 8).



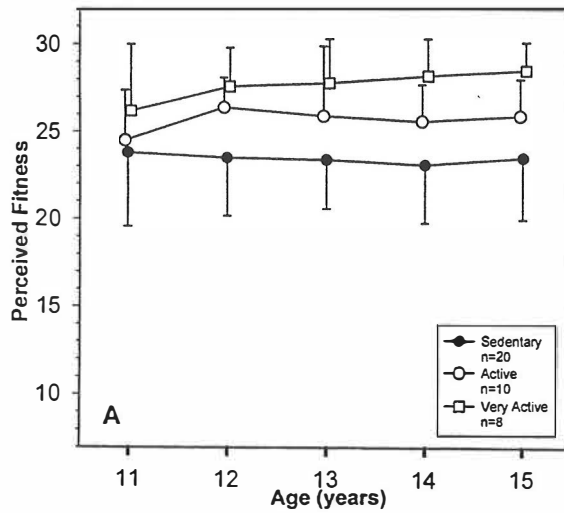


FIGURE 7 Perceived fitness: means, standard deviations and changes with age in three activity groups of girls

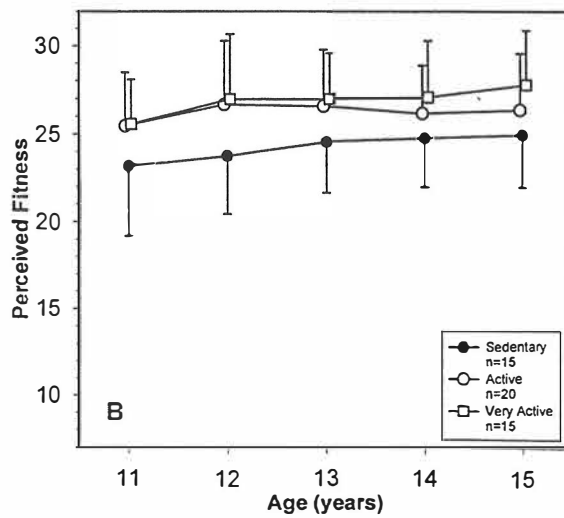


FIGURE 8 Perceived fitness: means, standard deviations and changes with age in three activity groups of boys

**Perceived fitness: Girls** (Figure 7). Statistical analyses and results in greater detail: MANOVA analysis was used to study whether there were differences among the three activity groups (sedentary, active and very active) in perceived fitness and how perceived fitness changed during the five follow-up measurements (age). A significant main effect was found for physical activity group ( $p = 0.001$ ), but not for age ( $p = 0.227$ ) or interaction between group and age ( $p = 0.637$ ).

Activity group effects: Univariate F-tests (one-way analyses of variance) revealed that at the first measurement at age 11 perceived fitness did not vary between the groups ( $p = 0.328$ ); but however, significant differences were observed later at the ages of 12 ( $p = 0.002$ ), 13 ( $p = 0.005$ ), 14 ( $p = 0.002$ ), and 15 ( $p = 0.001$ ). At these ages in which significant differences were found the means were subject to a modified LSD multiple comparison test. These tests showed that the sedentary girls had lower perceived fitness than the very active girls at all the ages of 12 ( $p < .01$ ), 13 ( $p < 0.01$ ), 14 ( $p < 0.01$ ) and 15 ( $p < 0.001$ ) and lower perceived fitness than the active girls at age 12 ( $p < 0.05$ ). The perceived fitness of the active and very active girls did not differ significantly at any age. Thus, the active and very active girls were combined and compared with the sedentary girls using contrast procedures. The combined physically active and very active girls showed higher perceived fitness than the sedentary girls at ages 12 ( $p = 0.001$ ), 13 ( $p = 0.002$ ), 14 ( $p = 0.001$ ), and 15 ( $p = 0.000$ ), but not at age 11 ( $p = 0.219$ ).

**Perceived fitness: Boys** (Figure 8). Statistical analyses and results in greater detail: Significant main effects were found for physical activity group ( $p = 0.020$ ) and age ( $p = 0.014$ ) but not for interaction between group and age ( $p = 0.634$ ).

Group effects: The univariate F-tests revealed that at ages 11 ( $p = 0.081$ ) and 14 ( $p = 0.113$ ) perceived fitness did not differ significantly between the physical activity groups; however, there were significant differences at ages 12 ( $p = 0.026$ ), 13 ( $p = 0.031$ ), and 15 ( $p = 0.054$ ). The modified LSD multiple comparison test revealed that the sedentary boys had lower perceived fitness than the very active boys at the age of 12 ( $p < .05$ ) and 15 ( $p < .05$ ). After that, the active and very active boys were combined and compared with the sedentary boys, using contrast procedures. The physically active and very active boys combined showed higher perceived fitness than the sedentary boys at every age: 11 ( $p = 0.026$ ), 12 ( $p = 0.007$ ), 13 ( $p = 0.009$ ), 14 ( $p = 0.052$ ) and 15 ( $p = 0.033$ ).

Age effects: The boys showed a tendency toward an increase in perceived fitness during the follow-up years. The differences between successive measurements (ages) were studied using univariate F-tests (repeated contrasts). The only statistically significant change was that perceived fitness increased from age 11 to age 12 ( $p = 0.008$ ).

**Perceived appearance: Boys and girls.** Perceived appearance did not differ between the physical activity groups (main effects for girls  $p = 0.853$ ; for boys  $p = 0.382$ ) and did not change during the follow-up period (main effects for girls  $p = 0.683$ ; for boys  $p = 0.231$ ). There was no interaction between group and time either among the girls (main effect  $p = 0.371$ ) or among the boys (main effect  $p = 0.631$ ).

**Self-esteem: Girls.** Self-esteem from the age of 12 to 15 did not differ between the physical activity groups ( $p = 0.679$ ), did not change during the follow-up ( $p = 0.084$ ), and no interaction was found between group and age ( $p = 0.931$ ). The sum index of self-esteem at age 11 was not included in the follow-up analysis, because the items of the scale were dichotomous. The univariate F-tests revealed that at age 11 self-esteem did not differ significantly between the physical activity groups ( $p = 0.638$ ).

**Self-esteem: Boys.** According to the Manova analyses, self-esteem from the age of 12 to 15 years did not differ between the physical activity groups ( $p = 0.087$ ), and there was no interaction between group and age ( $p = 0.928$ ). The main effect of age was significant ( $p = 0.011$ ). According to univariate F-tests (repeated contrasts) the self-esteem of the boys increased from the age of 14 to 15 ( $p = 0.015$ ). Univariate F-tests revealed that at the age of 11 years self-esteem did not differ significantly between the physical activity groups ( $p = 0.157$ ).

**Perceived importance of fitness: Girls.** The results showed a significant main effect for physical activity group ( $p = 0.023$ ), but the main effect of age ( $p = 0.485$ ) and group and age interaction ( $p = 0.685$ ) were not significant (Figure 9).

**Group effects:** The univariate F-tests revealed significant differences between the activity groups at ages 14 ( $p = 0.019$ ) and 15 ( $p = 0.004$ ) but not at ages 11 ( $p = 0.636$ ), 12 ( $p = 0.108$ ) and 13 ( $p = 0.176$ ). The modified LSD multiple comparison test revealed that the active girls valued fitness less than the very active girls at ages 14 ( $p < 0.05$ ) and 15 ( $p < 0.01$ ). The sedentary girls valued fitness less than the very active girls at age 15 ( $p < 0.01$ ).

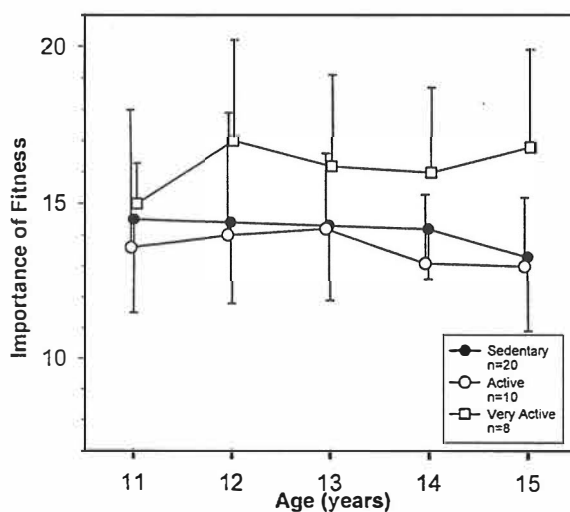


FIGURE 9 Perceived importance of fitness: means, standard deviations and changes with age in in three activity groups of girls

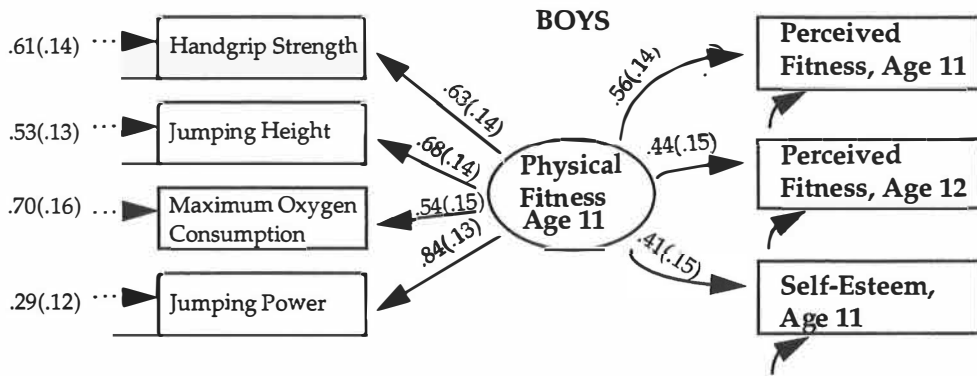
**Perceived importance of fitness: Boys.** Perceived importance of fitness did not differ between the physical activity groups ( $p = 0.146$ ) and did not change during the follow-up period ( $p = 0.197$ ). There was no interaction between group and age ( $p = 0.274$ ).

**Perceived importance of appearance: Boys and girls.** Perceived importance of appearance did not differ between the physical activity groups, did not change during the follow-up period and there was no interaction between group and age. The main effects were for physical activity group (girls:  $p = 0.744$ ; boys:  $p = 0.439$ ), age (girls:  $p = 0.925$ ; boys:  $p = 0.195$ ) and interaction between group and age (girls:  $p = 0.314$ ; boys:  $p = 0.454$ ).

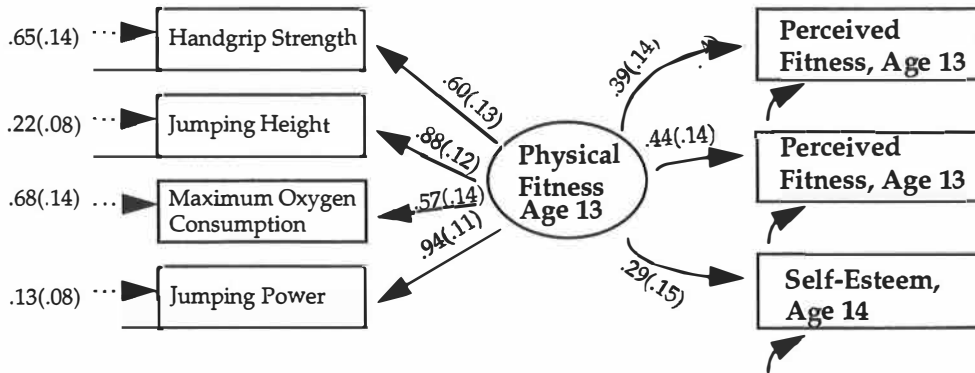
**Physical fitness (IV):** The results of this study indicated that the mean values of the physiological measurements of physical fitness increased with age. When the results of the measurements were related to body weight, only minor changes were observed with age. The differences among the three activity groups remained, however, so that the very active adolescents had significantly higher values than the active or sedentary adolescents.

### **7.3 Relationships between physical fitness, perceived fitness, and self-esteem**

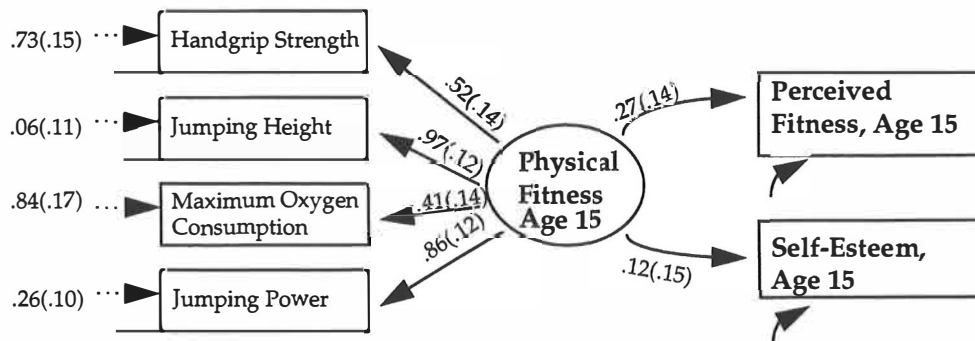
Sonstroem's hypothesis (1978) about the relationships between physical fitness and perceived fitness and self-esteem was statistically tested by using LISREL models. The regression relationships between the latent factor of physical fitness with four indicators and self-perceptions were studied at the ages of 11, 13, and 15 years. At the ages of 11 and 13 years the models included physical fitness and its effects on self-esteem and perceived fitness at the same age as well as on perceived fitness at the following age. The estimation and test results of these models are presented in Figures 10 and 11. Additionally, the statistical significances of the correlations between perceived fitness and self-esteem were studied using Pearson's product moment correlation.



100 R<sup>2</sup> (Perceived Fitness, age 11) = 31%, 100 R<sup>2</sup> (Perceived Fitness, age 12) = 20%, 100 R<sup>2</sup> (Self-Esteem, age 11) = 17%,  $\chi^2$  (11) = 12.083, p = 0.357, GFI = 0.938, RMR = 0.054, RMSEA = 0.04

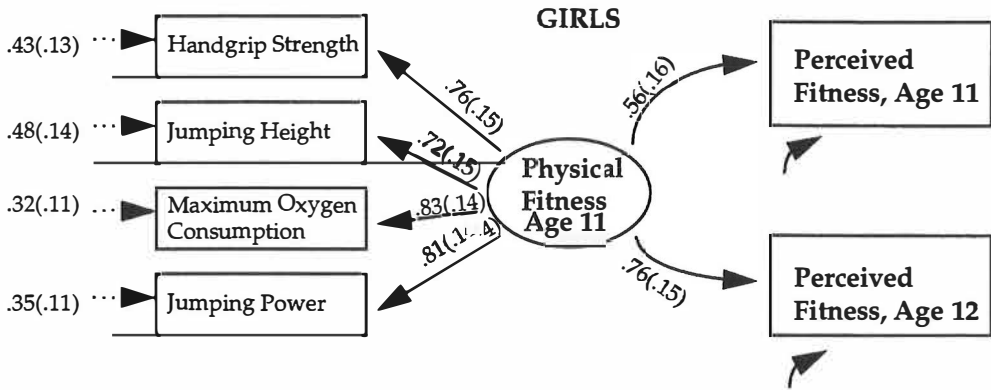


100 R<sup>2</sup> (Perceived Fitness, age 13) = 16%, 100 R<sup>2</sup> (Perceived Fitness, age 14) = 19%, 100 R<sup>2</sup> (Self-Esteem, age 13) = 8%,  $\chi^2$  (11) = 19.742, p = 0.049, GFI = 0.905, RMR = 0.078, RMSEA = 0.13

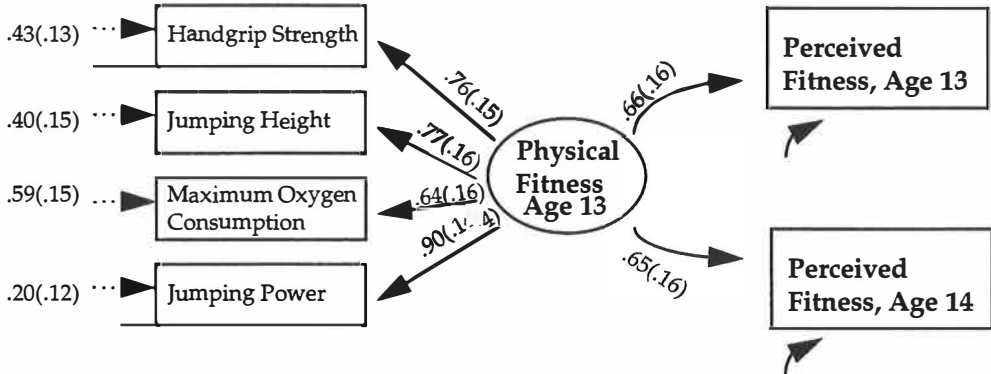


100 R<sup>2</sup> (Perceived Fitness, age 15) = 7%,  $\chi^2$  (8) = 15.158, p = 0.056, GFI = 0.915, RMR = 0.089, RMSEA = 0.14

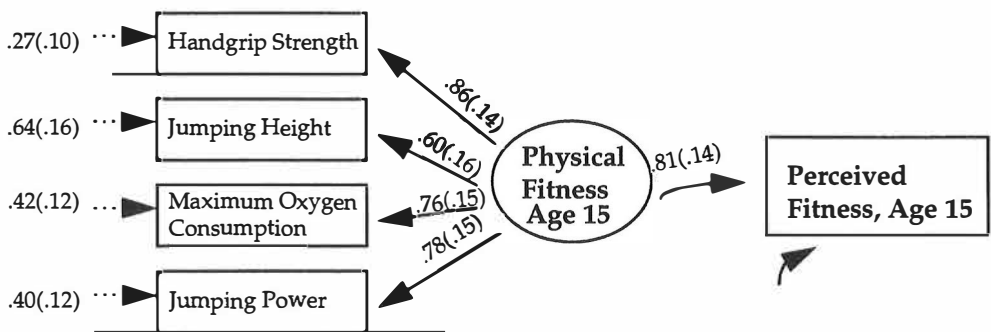
FIGURE 10 Estimation and test results of the Lisrel-models for the boys (n=50) at the ages of 11, 13, and 15 years (standard errors in parenthesis)



100 R<sup>2</sup> (Perceived Fitness, age 11) = 31%, 100 R<sup>2</sup> (Perceived Fitness, age 12) = 58%,  $\chi^2$  (7) = 9.303, p = 0.232, GFI = 0.933, RMR = 0.036, RMSEA = 0.094



100 R<sup>2</sup> (Perceived Fitness, age 13) = 43%, 100 R<sup>2</sup> (Perceived Fitness, age 14) = 42%,  $\chi^2$  (7) = 4.031, p = 0.776, GFI = 0.966, RMR = 0.0253, RMSEA = 0.0



100 R<sup>2</sup> (Perceived Fitness, age 15) = 66%,  $\chi^2$  (4) = 2.314, p = 0.678, GFI = 0.975, RMR = 0.029, RMSEA = 0.0

FIGURE 11 Estimation and test results of the Lisrel-models for the girls (n=38, except that in maximum oxygen consumption n=30) at the ages of 11, 13, and 15 years (standard errors in parenthesis)

Figures 10 and 11 present the results of the estimated squared multiple correlations ( $100 \times R^2$ s, percentiles of explanation) of the regression models. The estimated Lisrel models showed a good fit with the data (Jöreskog & Sörbom, 1993). Among the boys (Figure 10) the factor of physical fitness explained 31%, 16%, and 7% of the variances of perceived fitness at the ages of 11, 13, and 15, respectively. The effect of physical fitness become weaker during the follow-up period and was no longer statistically significant at the age of 15. Physical fitness also explained perceived fitness at the following age (20% and 19%). Perceived fitness and self-esteem correlated moderately (0.55,  $p < 0.01$ ; 0.32,  $p < 0.05$ , and 0.37,  $p < 0.01$  respectively, at the ages of 11, 13, and 15). These results are in accordance with Sonstroem's (1978) hypothesis. Against the hypothesis, physical fitness also directly explained 17% and 8% of self-esteem at the ages of 11 and 13 years, respectively.

Among the girls (Figure 11) physical fitness explained 31%, 43%, and 66% of the variance of perceived physical fitness at the age of 11, 13, and 15 years, respectively. Physical fitness also explained perceived fitness at the following age, and at the age of 13 years even more than that at the same age. However, the percentages explained (31% and 58%) did not differ statistically significantly ( $\chi^2(1) = 2.34$ , n.s.). Physical fitness did not explain self-esteem. Against the hypothesis the correlations between perceived fitness and self-esteem were low (0.20, 0.21, and 0.11) and not significant.

It can be concluded that physical fitness explained perceived fitness, according to Sonstroem's (1978) hypothesis. The effect became weaker among the older boys and stronger among the older girls.

## 8 DISCUSSION

Investigating the development of self-perceptions was one of the aims of the present study. It is surprising that numerous experimental studies attempting to enhance for example self-esteem have been done whereas so few developmental studies exist. Knowledge of the development of a certain phenomenon is usually, however, essential for interventions to be successful. One purpose of the present project was to study the possible psychological benefit to be gained from regular exercise. The natural history of habitual physical activity was followed in early adolescence in order to study whether exercise has any effect on self-perceptions. Change effects have generally been studied through interventions designed to enhance physical activity. With the longitudinal design of the present study it was possible to avoid many of the methodological problems of interventions. We are not aware of any other long-term follow-up study with comparable aims.

One of the primary goals of this study was to devise an instrument which would provide a profile of perceived physical competence in late childhood and adolescence. The Perceived Physical Competence Scale was developed to reflect the multidimensional and hierarchical ideas of contemporary self-concept research.

### 8.1 The Perceived Physical Competence Scale

The Perceived Physical Competence scale was developed in the present study. The scale is similar in philosophy to the multidimensional scales of Harter (1982) and Fox and Corbin (1989), developed for children and adults, respectively. Perceived fitness and perceived appearance lie at a mid-range level of competence generality in between self-esteem and more task-specific self-efficacies.



The rationale for the construction of earlier scales has been empirical. Items have been designed intuitively and have dealt with physical activity and body parts. In this study the model of Physical Performance Capacity (Pitkänen et al., 1979; Nupponen, 1981) served as the theoretical basis for the construction of the items. This model offers a general view of the existing physiological bases for the formation of a person's perceived physical competence. Furthermore it was assumed that factors associated with appearance are also important elements of perceived physical competence (Shavelson & Bolus, 1982). Other existing scales of perceived physical competence only partially cover this area. However, recently Marsh & Sutherland-Redmayne (1994) introduced a scale which covered the same area as the scale of the present study. In addition, their measure includes the subscale of balance.

The results of the factor analyses indicated that the subscales measure independent but correlated latent constructs (perceived fitness and perceived appearance), lending support to their discriminant validity. The factor structure was not unambiguous at the age of 10 years, but later the factor of Perceived Fitness proved to be sufficiently unidimensional during the follow-up for the purposes of the present study. The two-factor structure was applied to a further sample of adolescents with disabilities. Fox's Physical Self-Perception Profile modified for use with 12- and 15-year-old adolescents (Biddle & al, 1993) consists of four subdomains aiming to measure the same construct as the Perceived Physical Competence scale of the present study. In addition, it is proposed that a higher order domain of physical self-worth underpins the subdomains. However, the four-factor structure was not completely clear. Marsh & Sutherland-Redmayne (1994) identified five subdomains aiming to measure perceived physical competence in young adolescent girls. Their results also provided support for a multidimensional, hierarchical model of physical self-perceptions. Harter (1982, 1988) has found that the structure of perceptions of competence become more differentiated with age. It is probable that the structure of physical self-perceptions also become more differentiated with age.

The sum-index of Perceived Appearance was used in the present study because the results acquired with this scale had good construct validity. Perceived appearance also proved to be highly stable among the boys. However, the internal consistency of the scale is low. In other connections it is recommended that each item be used separately.

The test-retest reliability coefficients revealed that the scales have both a good short-term (two weeks) and long-term (six months - one year) test reliability. The internal consistencies of the two scales were somewhat below conventionally accepted standards. Since the purpose of this study was to construct a measure which covers the area of perceived physical competence, it was not thought appropriate to discard items mechanically because of their measurement qualities (Konttinen, 1981).

Available for comparison and interesting from an extreme and norm group validation perspective are data from a representative sample of adolescent students from Central Finland and a group of students with disabilities. The physically active groups of the follow-up sample had a higher perception of their fitness than the representative sample of students or the sample of students with disabilities. In addition, their perceptions of fitness were at the same level as those of athletes participating in Winter Sports Games

(Lintunen, Rahkila, Silvennoinen, Viitasalo, & Österback, 1989; Lintunen & Rahkila, 1989) and also adult ice-hockey players (Koivulahti & Rytönen, 1988). These results indicate the good discriminant validity of the scale. The result that perceived fitness predicted further physical activity is consistent with the competence motivation perspective according to which perceived ability encourages involvement. Perceived appearance appears to be less well explained by competence motivation as it was not associated with degree of activity involvement.

The construct validity of the Perceived Physical Competence scale is supported by the meaningful correlations between the sum indices of Perceived Fitness, Perceived Appearance and other self-perceptions. Multitrait-multimethod analysis also supported the concurrent validity of the scale of Perceived Fitness.

The purpose of this study was to develop, for research purposes, a scale of perceived physical competence that would cover the area of the physique (physical performance capacity and appearance). Sports psychologists are nowadays seeking sport-specific tests. Often their aims are connected with elite sports and the understanding of optimal and top performance. These goals are, however, difficult to attain because even the natural development of e.g. different identity areas (physical, social) are not well understood. The present scale has been constructed to acquire knowledge of perceived physical competence, which has been considered in late childhood and early adolescence to be an important precursor of psychological well-being. The measure is suitable for both athletes and non-athletes and adolescents with disabilities. The Perceived Physical Competence scale is recommended for use in research, but with caution and further psychometric assessment.

In addition the information provided by the Perceived Physical Competence scale could help to sensitize physical education teachers and coaches to the special needs of pupils with low perceived physical competence. Changes over time could also be assessed following physical education programs. Caution is needed, however, in the practical use of this kind of instrument. Answers obtained in a neutral and private research situation may well differ from those obtained elsewhere. The evaluation of a person's own competence may also add to anxiety.

The Perceived Importance of the Physical Competence scale was constructed to accompany the Perceived Physical Competence scale and provide a measure of the importance attached by adolescents to their respective levels of physical fitness and appearance. Conceptually, importance scores can be seen as a mediating factor between perceived competence subdomains and self-esteem. Both importance scales had high values of internal consistency. The theoretical validity of the scale was supported by the result that the perceived importance of fitness among the girls predicted physical activity. Most of the boys and the very active girls perceived physical fitness as very important.

## 8.2 Development of self-perceptions

One aim of this study was to investigate changes in the mean levels and stability of self-perceptions. We also attempted to identify and consequently discount those "changes" in scores that reflected measurement unreliability.

### 8.2.1 Changes in the mean levels of self-perceptions

On average, these adolescents had positive self-esteem during the follow-up period. However, the girls had lower self-esteem than the boys. This result is in agreement with most previous research (Harter, 1988; Rosenberg, 1985; Simmons & Blyth, 1987), which suggests the prevalence of self-esteem differences, although often fairly minor, between boys and girls.

Self-esteem among the boys increased from age 14 to 15 and that of the girls from age 13 to 14. This result is broadly in line with that of other investigators who have also noted a gradual rise in measures of adolescents' self-esteem (O'Malley & Bachman, 1983).

These adolescents evaluated their fitness positively during the follow-up period. No gender differences were found in perceived fitness between the boys and girls in the same activity group, but the more physically active groups of both sexes had higher perceptions of their fitness than the less active groups of the opposite sex. This finding contradicts earlier findings in which boys often show more positive perceptions of physical competence (Felz & Petlichkoff, 1983; Harter, 1988; Marsh, Barnes, Cairns & Tidman, 1984; Marsh, 1989; Ulrich, 1987). Amount of physical activity and level of intensity may be important determinants of perceptions of physical competence. Physically active groups typically show higher perceptions of physical competence than less active groups (Biddle & Amstrong, 1992; Felz & Petlichkoff, 1983; Marsh, Perry, Horsely, & Roche, 1995; Roberts, Kleiber, & Duda, 1981; Ulrich, 1987). Level of sports participation has not usually been considered or standardized in earlier studies comparing boys and girls. Girls, on the average, are less physically active than boys (King & Coles, 1992) and may thus have lower perceived physical competence.

The overall changes in perceived fitness were small during the follow-up. Perceived fitness increased among both the girls and the boys from age 11 to 12 and later from age 14 to 15. In between, however, there was a plateau from age 12 to 14. There were none of the U-shaped effects suggested by Marsh (1989) either in this or the other variables studied here. The reason is possibly the age of our subjects - 11-15-years - which was the turning point of the U-shaped curve in the study by Marsh.

Significant differences were found in perceived appearance between the sexes. The girls' perceptions of their appearance decreased and those of the boys increased. This difference between the sexes is in agreement with earlier research (Clifford, 1971; Harter, 1988; Marsh, 1989; Martin & Walter, 1982; Petersen, 1981; Petersen, Schulenberg, Abramowitz, Offer & Jarcho, 1984; Rauste-von Wright, 1989). The decrease in perceived appearance among the girls, but not among the boys, was in accordance with the gender intensification

hypothesis and the results of Simmons and Blyth (1987). In the other variables studied here, there were no signs of any such increase in the differences between the sexes during early adolescence. In addition to these differences in the level of perceived appearance, substantial differences in stability between the sexes already existed at the beginning of the follow-up period.

### 8.2.2 Stability of self-perceptions

Previous longitudinal research (mainly regarding self-esteem) has shown the correlations between two time-points to be fairly high, thus indicating high stability during adolescence (Alsaker & Olweus 1992; O'Malley & Bachman 1983). The results of the present study suggest that both stability and reliability vary depending on the specific self-perception domain in question as well as the gender group involved. In this study the overall reliabilities were higher among the girls than among the boys, although they were acceptably high among the boys as well. Chance may possibly play a greater role in the way the boys fill in questionnaires.

We found that the overall stability varied between the sexes, with the boys showing highly stable self-perceptions throughout the follow-up. Boys relatively high (or low) in self-perceptions at the beginning of the study tended to retain these self-perceptions during the follow-up. Among the girls, stability varied between the different variables with perceived appearance showing the lowest stability. The stabilities of self-esteem and perceived fitness were higher, but nevertheless slightly lower than among the boys. Our raw self-esteem correlations, however, did not differ between the sexes, a result which is similar to the findings of Alsaker and Olweus (1992). This indicates that our data is comparable with earlier studies. Simplex-models, however, enabled more versatile and statistically effective analyses.

The analysis of disattenuated stability using Simplex-models has not been previously employed for boys and girls separately, nor at the ages of our subjects. Moreover, few earlier follow-up studies have focused on several domains of self-perception simultaneously. It is important to emphasize, however, that because of the small size of the sample characteristic of many longitudinal studies, it may conceivably be unrepresentative, and these analyses must be viewed as exploratory.

Alsaker and Olweus (1992) have concluded that self-esteem is likely to become more fixed or more consolidated with increasing age. Our results were in accordance with this gradual consolidation hypothesis. The stabilities of self-esteem increased during the follow-up. The boys showed, however, a highly stable self-esteem already from the beginning of the study (age 12). The two other self-perception variables among the boys were also stable already from the age of 11, and these stabilities did not increase with age. The stabilities of all the variables among the girls increased during the follow-up. The high stabilities among the boys may indicate the early emergence of a fixed self-concept.

The finding that the boys had more stable perceived fitness than the girls is in accordance with the hypothesis put forward by Eccles & al. (1989) that gender role-related personality characteristics are more stable in the sex for which these are gender-role appropriate. Perceived appearance, however, was also highly stable among the boys and unstable among the girls, who place high

value on looks, weight, and body-build (Simmons & Blyth, 1987).

To conclude, the findings of our study suggest that stability and change vary considerably, depending on both the specific domain of self-perception and gender. The self-perceptions of the girls were more unstable than those of the boys. In addition, the mean levels of both self-esteem and perceived appearance were lower among the girls. These results may indicate greater psychological disturbance among girls resulting from societal constraints and pressures. The extremely stable and positive self-perceptions of the boys may indicate the early emergence of a fixed self-concept. This result raises the question of the role of illusory or biased self-perceptions, especially among boys. Further longitudinal studies with other samples are needed to verify these gender differences in stability and change.

Many theorists have argued that accurate perceptions of the self are essential for mental health. Yet research evidence suggests that overly positive self-evaluations, exaggerated perceptions of control and mastery, and unrealistic optimism are characteristic of normal human thought (Taylor & Brown, 1988). These positive illusions may be especially useful and adaptive when an individual receives negative feedback or is otherwise threatened.

Although research has mainly focused on adults the group mean levels of self-perceptions in the present study suggest that mildly distorted self-perceptions are also common among adolescents. A realistic view of the self is sometimes mentioned as an educational goal. However, caution is needed in attempts to make children's self-perceptions more realistic, because mildly unrealistically positive self-evaluations are related to adaptivity, activity and perceptions of control. Enhancing positive self-perceptions through school and training programmes remains a safer educational goal.

High self-esteem does not, however, mean feelings of superiority or perfection (Rosenberg, 1985). Exaggerating accomplishments and talents and expecting to be noticed as "special" even without appropriate achievement are characteristics of the narcissistic personality (John & Robins, 1994). Narcissistic individuals will also show a general tendency towards self-enhancement, particularly when the context is evaluative and ego involving and when failure would be threatening. It is problematic that narcissism and high self-esteem are difficult to separate in empirical analyses.

The reason for the stability and small changes in the mean levels of self-perceptions observed during adolescence may lie partly in the defence of the conscious self-concept against threatening or inconsistent information by means of various mechanisms (see e.g. Epstein, 1985; Greve & Brandtstädter, 1989; Guidano & Liotti, 1985; Ihilevich & Gleser, 1986). Secondly, according to Coleman's (1978) focal theory, adolescents cope by dealing with one stressful issue at a time. They spread the process of adaptation over a span of years, attempting to resolve first one issue and then the next. The stresses resulting from the need to adapt to new modes of behavior are rarely concentrated all at one time (Coleman 1978).

### 8.3 Exercise and self-perceptions

This study examined the relationships between exercise and self-perceptions according to the change and the selection hypotheses. The findings differed for the boys compared to the girls. The results for the girls correspond to the change model. No differences in perceived fitness were found at the beginning of the follow-up period at the age of 11 between the sedentary, active and very active groups. During the later years, however, the two physically active groups of girls had higher perceptions of their fitness than the sedentary girls. These results lend support to the view that exercise increases perceptions of physical competence.

The two physically active groups of boys had higher perceptions of their fitness than the sedentary group both at the beginning as well as during the follow-up years. Whether the differences which already existed in perceived fitness among the boys at the age of 11 were due to selection or change is questionable, as these boys had been involved in organized sports for an average of two years before the beginning of the study.

No differences were found in self-esteem among the three activity groups, either among the girls or among the boys, even though an increase in self-esteem in the physically active groups was anticipated according to the Exercise and Self-Esteem Model (Sonstroem & Morgan, 1989). This result is, however, in accordance with earlier cross-sectional studies where athletes have demonstrated higher perceptions of physical competence but no or minor differences in self-esteem when compared to nonathletes (Marsh & Jackson, 1986; Marsh & Peart, 1988). The placebo or Hawthorne effect may be responsible for the increase in self-esteem observed after the intervention studies. Exercise is probably not a very effective way to enhance self-esteem, which the present study has also shown to be very stable already during early adolescence.

At its best, perception of physical competence is only one contributor to self-esteem. Other areas, like perceptions of academic or social competence, may be equally or more important. Fox (1992) has suggested that unconditional social support and style of achievement orientation may also have a significant impact on the development of youngsters' self-esteem. Another explanation for no changes in self-esteem might be that these adolescents already had considerably high self-esteem. Research has shown that the greatest effects of physical activity interventions are often found in children with low self-esteem (McAuley, 1994).

Although no changes in self-esteem were found, positive perceptions of physical competence might be goals worth pursuing, due to their potential in promoting lifelong physical activities (Sonstroem, Speliotis & Fava, 1992).

Physical fitness was lower among the active and sedentary groups than among the very active adolescents from the beginning of the study. Perceptions of fitness were, however, higher among both the very active and active groups and lower only among the sedentary adolescents. It was concluded that even participation in organized exercise of relatively low frequency (2-5 hours/week, the level of the active group) was enough to generate high perceptions of fitness among the active adolescents, even though their actual fitness remained at the same level as that of the sedentary adolescents. Participation alone was enough

to increase perceptions of fitness: actual fitness gains were not necessary among these adolescents. This was especially true at the beginning of the follow-up at the age of 11-12 years among the girls and at the age of 11-13 among the boys.

Later perceptions of fitness among the active group fell between those of the very active and the sedentary groups. This kind of "realization" concerning perceptions of fitness in the active group probably mirror cognitive changes emerging from the ages of 12 to 13, when children become able to differentiate the concept of ability from those of effort (for example sports participation), luck, and difficulty (Nicholls, 1990). Differentiation may lead to doubts about competence.

Perceptions of fitness did not increase more in the very active group of adolescents than in the less active groups even though the very active adolescents trained intensively (8-14 hours/week). Marsh, Perry, Horsely and Roche (1995) also found that athletes' perceptions of their physical competence did not differ greatly from that of nonathletes. Social comparison theory (Festinger, 1954; Ybema & Buunk, 1995) suggests that significant others provide an important frame of reference. Hence, depending on the frame of reference the same objective accomplishments can lead to different self-concepts. Part of the reason for the relatively small differences in perceived fitness among the three activity groups in this study may be different reference groups: the very active adolescents, for example, may have compared themselves to other competent peers.

The perceived importance of fitness did not differ between the activity groups or show any change during the follow-up period among the boys. All the boys valued fitness highly. Among the girls there were no differences between the activity groups from the ages of 11 to 13 years, although from 14 to 15 the very active girls valued fitness higher than the active and sedentary girls. The self-concept models posit that the effect of specific domain (for example perceived fitness) on self-esteem should vary with the importance an individual places on that specific domain. Empirical support for this prediction is weak (Marsh, 1986; 1994; Marsh & Sonstroem, 1995). The results obtained from this study also failed to support this prediction. The self-esteem of the very active girls, who valued fitness highly and who had high perceptions of physical competence, did not differ from the self-esteem of the less active girls, who valued physical fitness less.

The results for the perceived importance of fitness among the girls from the age of 12 upwards were congruent with Rosenberg's (1982, 538) hypothesis in that an individual "will be disposed to value those things at which he considers himself to be good and to devalue those qualities at which he considers himself poor". But he also recognized that "the freedom to select one's values in a fashion congenial to one's self-image is not, of course, without limit". For boys the pressures of society may be excessive. The boys in the present study valued fitness highly regardless of their exercise activity. Boys may not have much freedom to select.

It has been suggested that perceived importance ratings contribute to exercise activity (Marsh & Jackson, 1986; Sonstroem & al., 1992). However, the results of the present study suggest that exercise participation increases perceptions of importance among girls. The very active group of girls did not value fitness at the beginning more than the other groups, but later in the

course of participating in exercise their importance ratings increased.

The findings of the present study support the selection effect in physical fitness, especially among the girls, so that those who were more fit at age 11 were also more active during the four-year follow-up. No distinguishing trends were observed in the fitness profiles of the three activity groups. The increase in the absolute fitness variables of the very active adolescents, who were training strenuously (mean 8-12 supervised hours / week), was the same as the increase among the active and sedentary groups. The vigorous nature of growth during adolescence probably masks the effects of exercise on fitness.

This study has attempted to determine the change and selection effects of exercise on self-perceptions and physical fitness. Change effects of exercise were seen in the girls' perceptions of fitness and importance of fitness. Self-esteem and perceptions of appearance did not change. Selection effects were great in the fitness variables among both sexes. These adolescents were already self-selected at age 11 according to fitness. Those who had the highest fitness at age 11 years of age were going to be very active during the four years to come. The mechanism of this selection process is not known. Children's and adolescents' self-perceptions may be formed in part by comparing their performance with others as posited in social comparison theory. It is also possible that coaches select potential athletes or at least pay more attention to those possessing the most desirable characteristics for training and thus keep the athletes on training.

#### **8.4 Relationships between physical fitness, perceived fitness, and self-esteem**

The results were in accordance with Sonstroem's (1978) hypothesis. Physical fitness explained perceived fitness according to the hypothesis. An interesting new finding was that the effect was weaker among the older boys and stronger among the older girls. Perceptions of fitness seemed to become more realistic among the girls and more unrealistic among the boys during the four-year follow-up period from the age of 11 years to the age of 15 years. On the basis of previous research in both the academic and physical domains (Felz & Brown, 1984; Harter, 1982; Horn & Weiss, 1991; Marsh, 1993; Ulrich, 1987), it was hypothesized that accuracy in competence judgements would increase with the progression of the early adolescence. According to Nicholls (1978) accuracy increases because children become cognitively more capable of analyzing the causes of performance outcomes. That is, on average, after age 12 they are able to distinguish between effort, ability, and luck as determinants of performance outcome (Nicholls, 1990) and thus cognitively able to accurate perceptions of competence.

Being physically competent is clearly socially desirable for boys; therefore they may have had a strong tendency to overrate themselves. Defence of self may prevent a realistic evaluation of fitness. These boys may have denied feelings of weakness because fitness is so highly valued. Girls are not rewarded for overstating perceptions: boasting is unfeminine. Hence the self-ratings of the



girls were more realistic than those of the boys. Again, boys seem to have more illusory image of themselves than girls.

Among the girls at age 15 the factor physical fitness explained much of the variance in perceived fitness (66%). Marsh & Sutherland-Redmayne (1994) also found that correlations between the second order factors of physical fitness and physical self-concept were substantial ( $r = 0.76$ , corresponding to the percentile of explanation of 58%) among the girls at the age of 13-14. These percentages of explanation are very high, especially since they represent the association between the physiological and psychological variables.

According to Sonstroem's (1978) hypothesis perceived fitness and self-esteem correlated moderately among the boys. Against the hypothesis, this relationship was not found among the girls. This may indicate the greater importance which perceiving oneself as physically competent plays in the self-system of adolescent boys. The unexpected direct relationship between fitness and self-esteem observed among the 11-year-old boys may also indicate this. Otherwise the results supported Sonstroem's hypothesis that perceived fitness is a mediating factor between physical fitness and self-esteem.

## 8.5 Limitations of the study

The problems in longitudinal studies include relocating participants, choosing appropriate methods in order to discern changes, not to mention the costly and time-consuming nature of such data-gathering. Consequently, most information has been based on cross-sectional studies.

In exercise science there are often profound differences between the findings of cross-sectional and longitudinal investigations. This study benefited from the advanced statistical methods and a longitudinal design, for example, in respect of the results of the development of self-perceptions and the effects of exercise on self-perceptions.

The participants of this study were not a representative sample of a defined population. An epidemiological prospective study, comparing physically active children with a randomized group of less-active children over a long period, has never been conducted and apparently cannot be carried out for practical reasons (see Mednick, 1981; Kemper, 1994). Our participants were healthy adolescents, representing extreme groups in relation to the amount of physical activity they practiced. Consequently, tentative conclusions can be drawn.

The drop-out phenomenon was present in this study, as it often is in longitudinal research. Even though the follow-up time was long, and the fitness tests were strenuous, including for example blood samples, commendably many of our participants continued the throughout the follow-up period. The drop-out rate probably did not effect the results severely because those who dropped out did not differ from those who continued to participate in any of the self-perception, physical fitness or anthropometric variables studied. The adolescents who dropped out were, however, less physically active at the beginning of the study compared to those who continued for the length of the study. If dropping

out had continued, most of the drop-outs would probably have been located in the sedentary group.

## 8.6 Future research

The findings discussed in this thesis point to the need for the further development of instruments for measuring perceptions of physical competence. The scale developed in this study proved to be suitable for measuring perceived physical competence longitudinally in early adolescence. More differentiated measures may be needed in later adolescence, as Fox (1992) has indicated. Potentially useful directions for future research in developing instruments for measuring perceived physical competence include constructing stronger tests for hierarchical models and further study of the relations between the hierarchy of the physical self-perceptions and the hierarchy of physical fitness measures.

The Perceived Fitness scale adopts a comparative, or ego, orientation where adolescents are asked to rate themselves relative to others. There appears to be a need, therefore, to also include mastery, or self-related, judgements of competence (Roberts, 1992).

The results raised the question of the role of illusory or biased self-perceptions among the boys. Further longitudinal studies with other samples are needed to verify these results. It is important to study boys and girls separately, because in the present study differences appeared between the sexes in stability, accuracy, and level of self-perceptions. In addition, further knowledge of self-perceptions, motivation, and sport experiences among active and sedentary groups would be interesting.

This study has taken a step in the direction of defining the change and selection effects of exercise on self-perceptions. Exercise participation seemed to increase perceptions of fitness, especially among the girls. Further research is needed to study the effects of exercise on more task-specific, hierarchically lower level aspects of physical self-perceptions. These may be even more susceptible to change and thus provide suitable goals for pedagogical interventions.

The relationships and reciprocity between exercise, fitness, and self-perceptions are complicated. Therefore they should be studied together. Time has passed since the beginning of the present study, but no comparable longitudinal studies in the field of developmental exercise psychology have been reported.

Self-perceptions are formed in part by comparing one's performance with others. Researchers, coaches and teachers should counterbalance this tendency by studying and developing curricular adaptations and instructional modifications that emphasize mastery orientation, individualization, and cooperative learning experiences (Ames, 1992; Block, 1994; Graham, 1992; Ashworth, 1994; Sherrill, Heikinaro-Johansson, & Slininger, 1994).

## 9 YHTEENVETO

Minäkäsitystä voidaan tarkastella lukuisten eri teoriasuuntausten käsittein. Tämän työn teorialähtökohdat ovat kognitiivisessa psykologiassa, joka tällä hetkellä on minäkäsitystutkimuksen vallitseva suuntaus. Kognitiivisessa psykologiassa pidetään keskeisinä minäkäsityksen osa-alueina itsearvostusta ja pätevyydenkokemuksia, joita tässä tutkimuksessa tarkastellaan.

Kognitiivisen psykologian sekä myös useimpien muiden persoonallisuusteorioiden ja terapiasuuntausten mukaan korkea itsearvostus ja myönteinen käsitys omasta pätevyydestä ovat keskeisiä psyykkisiä voimavaroja. Lukuisissa interventiotutkimuksissa onkin pyritty lisäämään osallistujien itsearvostusta tai fyysisiä pätevyydenkokemuksia liikuntaohjelmien avulla. Interventiotutkimusten tulosten tulkinta on kuitenkin vaikeaa, koska näihin tutkimuksiin liittyy runsaasti metodologisia ongelmia ja koska minäkäsityksen kehittymistä ei tunneta riittävästi, näin kehitykseen liittyvät muutokset, esimerkiksi pätevyyden kokemusten nousu tai lasku, saatetaan tulkita intervention vaikutuksiksi. Tämän tutkimuksen tavoitteena olikin kuvata minäkäsityksen kehitystä varhaisnuorudessa neljän vuoden seurannan aikana. Tutkimuksessa kuvataan itsearvostuksen ja fyysisten pätevyydenkokemusten kehittymistä liikuntaa harrastavilla ja harrastamattomilla nuorilla. Lisäksi tarkastellaan minäkäsityksen ja fyysisen suorituskyvyn yhteyksiä.

Tutkimus on osa laajempaa monitieteistä Lapsiurheilututkimusta, jonka tarkoituksena oli tutkia liikuntaa harrastavien lasten fyysistä ja psyykkistä kehitystä. Tutkittavat nuoret valittiin harkinnanvaraisesti siten, että mukaan saatiin liikuntaa aktiivisesti harrastavia ja harrastamattomia nuoria. Ensimmäisellä mittauskerralla syksyllä 1982 mukaan valittiin 45 tyttöä ja 73 poikaa, yhteensä 118 nuorta, jotka olivat tällöin keskimäärin 10-vuotiaita. Nuoret harrastivat uintia, telinevoimistelua tai jääkiekkoa. Mukana oli myös 13 tyttöä ja 15 poikaa, jotka eivät osallistuneet ohjattuun liikuntaan. Tällä ensimmäisellä mittauskerralla kerättyjä tietoja käytettiin koetun fyysisen pätevyyden mittarin laadintaan.

Tutkimuksen varsinainen seurantaosa alkoi syksyllä 1983. Tällöin tutkimukseen otettiin mukaan 17 uutta tyttöä ja 7 poikaa, jotka opiskelivat musiikkia Keski-Suomen konservatoriossa eivätkä harrastaneet ohjattua liikuntaa. Tällöin tutkittavia oli mukana yhteensä 142 ja he olivat keskimäärin 11-vuotiaita. Neljän seurantavuoden aikana (11-15-ikävuosien välillä) heistä 113 (80%) oli mukana

kaikilla mittauskerroilla ja vastasi kaikkiin kyselylomakkeisiin ja osallistui haastatteluihin. Kato johtui tutkimuksesta kieltäytymisestä (n=10), kieltäytymisestä osallistua yhteen tai useampaan mittaukseen seurannan kuluessa (n=9), paikkakunnalta muutosta (n=9) ja yhden nuoren kuolemasta.

Kadon vaikutusta tuloksiin arvioitiin vertaamalla tutkimuksesta ensimmäisen seuranta vuoden jälkeen poisjääneitä niihin, joilta oli saatavissa kaikki mahdolliset mittauksiedot neljältä vuodelta. Seurannan kuluessa tutkimuksesta pois jääneet harrastivat vähemmän ohjattua liikuntaa 11-vuotiaana kuin mitä koko ajan mukana pysyneet harrastivat 11-vuotiaana. Minäkäsitysmittauksissa, kuntotuloksissa tai kehonrakenteessa ei ollut eroja ryhmien välillä.

Tutkittavat jaettiin tutkimuksen loputtua koko seurannan aikaisen liikunnan harrastuksen keston ja intensiteetin mukaan kolmeen ryhmään käyttäen tutkimuksessa kehitettyä harrastushaastattelua, jossa kysyttiin koululiikunnan ulkopuolisen ohjatun liikunnan harrastuksen määrää. Haastattelun perusteella laskettiin keskimääräinen ohjattuun liikuntaan käytetty aika viikossa. Tutkittavat jaettiin liikuntaa harrastamattomien ryhmään (15 poikaa ja 20 tyttöä), harrastajaryhmään (20 poikaa, 10 tyttöä), jotka harrastivat liikuntaa keskimäärin 2-5 tuntia viikossa koko seurannan ajan ja aktiiviharrastajien ryhmään (15 poikaa, 8 tyttöä), jotka harrastivat liikuntaa yli 5 tuntia viikossa koko seurannan ajan.

Mittaukset suoritettiin vuosittain kunkin tutkittavan osalta aina samaan aikaan syksystä Jyväskylässä Liikunnan ja kansanterveyden edistämisyksikön Urheilu- ja kuntotutkimusasemalla (nykyisin LIKES-tutkimuskeskus). Koulutuntien jälkeen tutkittavat osallistuivat minäkäsityskyselyihin, haastatteluun, kuntotesteihin ja kasvumittauksiin.

Tutkimuksen alkaessa ei ollut olemassa nykyisen minäkäsitystutkimuksen mukaiseen hierarkiseen ja moniulotteiseen ajatteluun (Fox & Corbin, 1989; Marsh & Shavelson, 1985; Shavelson, Hubner & Stanton, 1976) perustuvaa minäkäsitysmittaria, joten tutkimuksessa kehitettiin koetun fyysisen pätevyyden mittari, joka jakautuu koetun kunnan ja koetun ulkonäön osa-alueisiin. Mittari osoittautui reliabeliksi ja validiksi ja soveltuvaksi 10-15 -vuotiaille. Mittari soveltuu myös oppilaille, joilla on jokin vamma tai pitkäaikaissairaus.

Pysyvyydellä tarkoitetaan ihmisen aseman pysyvyyttä suhteessa omaan ryhmään. Suuri pysyvyys on siis mahdollista vaikka keskiarvoissa tapahtuisi muutoksia. Pysyvyyttä tarkastellaan usein mittauksen välisillä korrelaatioilla. Tässä tutkimuksessa minäkäsityksen pysyvyyttä tutkittiin Simplex-malleilla. Niiden avulla on mahdollista erottaa todellinen pysyvyys ja mittausvirhe, joten tilastoanalyysit ovat tehokkaampia perinteisiin menetelmiin verrattuna. Tässä tutkimuksessa poikien vastauksissa oli enemmän sattumanvaraisuutta eli reliabiliteetti oli niissä hieman alhaisempi kuin tyttöillä. Pojilla itsearvostus, koettu kunto ja koettu ulkonäkö olivat hyvin pysyviä ilmiöitä jo seurannan alusta alkaen ja osoittautuivat pysyvämmiksi kuin tyttöillä. Tyttöillä itsearvostus ja koettu kunto olivat pysyviä mutta koetun ulkonäön pysyvyys oli alhaisempi. Minäkäsitys muuttui iän myötä yhä pysyvämmäksi sekä tyttöillä että pojilla.

Tarkasteltaessa minäkäsityksen tasoa todettiin, että tutkittavien nuorten itsearvostus ja koettu kunto olivat keskimäärin myönteisiä ja että seurannan aikana ei havaittu suuria muutoksia minäkäsityksen tasossa. Tyttöillä oli jonkin verran alhaisempi itsearvostus kuin pojilla. Poikien kokemukset ulkonäöstään pysyivät myönteisinä koko seurannan ajan mutta tyttöjen kokemukset omasta ulkonäöstään muuttuivat negatiivisemmiksi 11-15-ikävuosien välillä.

Koetussa kunnossa ei tässä tutkimuksessa havaittu eroja tyttöjen ja poikien välillä, vaikka aiemmissa tutkimuksissa on pojilla todettu olevan tyttöjä korkeammat fyysisen pätevyyden kokemukset. Tulos johtuu todennäköisesti siitä, että tämä on ensimmäinen tutkimus, jossa liikunnanharrastuksen määrä vakioitiin verrattaessa tyttöjä ja poikia keskenään. Liikuntaa aktiivisesti harrastavien tyttöjen ja poikien kokemukset omasta kunnosta eivät eronneet ja toisaalta kun verrattiin liikuntaa harrastamattomien tyttöjen tuloksia liikuntaa harrastamattomien poikien tuloksiin ei niissäkään ollut eroja. Aktiiviharrastajilla oli korkeampi koettu kunto kuin liikunnallisesti passiivisilla nuorilla. Kun tytöt keskimäärin harrastavat poikia vähemmän liikuntaa selittyy aikaisemmissa tutkimuksissa tyttöjen ja poikien välillä havaittu ero liikunnanharrastuksen määrällä.

Yhteenvetona minäkäsityksen muutoksista voidaan todeta, että Shavelsonin, Hubnerin ja Stantonin (1976) minäkäsityshierarkiassa pysyvimmäksi minäkäsitysmuuttujaksi esitetty itsearvostus osoittautui tässäkin empiirisessä tutkimuksessa pysyvimmäksi muuttujaksi. Koettu kunto ja koettu ulkonäkö, jotka ovat alemman tason käsitteitä olivat tässä tutkimuksessa vähemmän stabiileja kuten mallissa oletetaan. Tosin nekin olivat huomattavan pysyviä.

Tyttöjen ja poikien välillä oli eroja minäkäsityksen pysyvyydessä ja tasomuutoksissa. Pojilla minäkäsitys oli hyvin pysyvä ja myönteinen 11-15-ikävuosien välillä. Tyttöjen minäkäsitys oli labiilimpi. Itsearvostus ja koettu ulkonäkö olivat heillä myös alhaisempia kuin pojilla. Tulosten perusteella voisi päätellä, että tytöillä olisi poikia enemmän psyykkisiä ongelmia, on nimittäin esitetty, että illusorisen myönteinen minäkäsitys liittyy psyykkiseen hyvinvointiin. Tämän näkemyksen mukaan ajatellaan, että myönteisten illuusioiden tehtävänä on ylläpitää ihmisen toimintakykyä auttamalla tulemaan toimeen epämiellyttävien ja uhkaavien asioiden kanssa. Toisaalta on esitetty, että pojat olisivat defensiivisempiä siten, että heidän olisi vaikeampaa myöntää heikkoudenkokemuksiaan. Tyttöjen ja poikien minäkäsityksen kehityksessä näyttää olevan suuria eroja.

Tutkimuksen tavoitteena oli myös tarkastella liikunnanharrastuksen mahdollisia vaikutuksia minäkäsitykseen ja toisaalta selvittää valikoituuko liikuntaa harrastamaan minäkäsitykseltään harrastamattomista eroavia nuoria. Tulosten mukaan liikunnanharrastusnäyttäisi lisäävän tyttöjen fyysisiä pätevyydenkokemuksia. 11-vuotiaana ei harrastavien ja harrastamattomien välillä ollut eroja, mutta 12-ikävuodesta lähtien liikuntaa harrastavilla tytöillä oli korkeammat koetun kunnan arvot kuin harrastamattomien ryhmällä. Liikuntaa harrastavilla pojilla oli jo alusta lähtien korkeammat koetun kunnan arvot kuin harrastamattomilla. Nämä pojat olivat harrastaneet liikuntaa jo ennen tutkimuksen alkamista, joten heidän kohdallaan ei voida sanoa onko kyseessä liikunnan aiheuttama muutos vai jo alunperin päteväksi itsensä kokemien valikoituminen liikunnanharrastajiksi.

Itsearvostuksessa ei ollut eroja harrastusryhmien välillä, mutta koettu kunto oli harrastajilla korkeampi kuin liikuntaa harrastamattomilla nuorilla. Sonstroemin ja Morganin (1989) mallin ja lukuisten aikaisempien interventiotutkimusten perusteella, joissa on todettu liikunnan kohottaneen itsearvostusta, olisi eroja voinut olettaa olevan. Tulos on kuitenkin yhtenevä aiempien poikkeikkaustutkimusten kanssa, joissa on todettu, että urheilijoilla on korkeammat koetun fyysisen pätevyyden kokemukset mutta ei eroja itsearvostuksessa



verrattuna ei-urheilijoihin. Tulos tukee käsitystä seurantatutkimuksen käyttökelpoisuudesta tällaisessa tutkimuksessa. Seuranta-asetelmalla pystyttiin välttämään interventiotutkimusten metodiset ongelmat, esimerkiksi placebovaikutus, tutkittaessa liikunnan vaikutusta minäkäsitykseen. Liikunta ei tämän tutkimuksen mukaan ole tehokas keino itsearvostuksen nostamiseen. Fyysiset pätevyyskokemukset kuitenkin kasvavat liikuntaharrastuksen seurauksena.

Valikoitumisilmiö näkyi kuntomuuttujissa sekä tytöillä että pojilla. Liikuntaa seurannan ajan intensiivisimmin harrastavien ryhmän nuorilla oli jo 11-vuotiaana parempi fyysinen kunto kuin liikuntaa jonkin verran harrastavilla tai harrastamattomilla nuorilla. Kun koettu kunto oli korkea myös liikuntaa jonkin verran harrastavilla, vaikka heidän todellinen suorituskykynsä oli harrastamattomien tasolla voidaan päätellä, että pelkkä liikunnan harrastus riittää kohottamaan fyysisiä pätevyyskokemuksia, todellisia kuntomuutoksia ei varhaisnuoruudessa tarvita.

Tutkimuksessa tarkasteltiin myös itsearvostuksen, koetun kunnan ja fyysisen suorituskyvyn välisiä yhteyksiä. Mitattu kunto selitti koettua kuntoa tutkimuksen alussa sekä tytöillä että pojilla. Seurannan kuluessa yhteys pieneni pojilla ja kasvoi tytöillä. Kokemukset omasta kunnosta näyttivät tulevan tytöillä realistisemmiksi ja pojilla epärealistisemmiksi 11-15-ikävuosien aikana. Fyysinen suorituskyky oli pojille tärkeämpää kuin tytöille ja saattaa olla, että pojilla on siksi suurempi taipumus yliarvioida itseään torjuakseen heikkoudenkokemukset. Korkea fyysinen suorituskyky ei ole tytöille yhtä tärkeää kuin pojille, joten tytöillä on ehkä varaa realistisiin itsearviointeihin.

Tämä tutkimus on lisännyt tietoa minäkäsityksen kehityksestä varhaisnuoruudessa. Tässä työssä mitatut minäkäsityksen osa-alueet osoittautuivat yllättävän pysyviksi ilmiöiksi. Jatkotutkimuksissa olisi tarpeen tutkia ovatko Shavelsonin ym. (1976) esittämän minäkäsityshierarkian alemman tason osa-alueet helpommin muuttuvia ja samalla helpommin vaikutettavissa esimerkiksi pedagogisin keinoin. Tällaista tutkimusta on mahdollista tehdä ainoastaan seuranta-asetelmaa käyttäen. Tämän tutkimuksen aloittamisesta on jo kulunut aikaa, mutta vastaavia seurantamenetelmää käyttäviä liikunnan kehityspsykologisia tutkimuksia ei ole raportoitu.

Tässä tutkimuksessa todettiin tyttöjen ja poikien välillä eroja minäkäsityksen pysyvyydessä, realismisuudessa ja joillakin osa-alueilla myös tasossa. Koska tyttöjen ja poikien välillä on suuria eroja minäkäsityksessä on jatkossa syytä tällaisten vertailevien tutkimusten lisäksi tarkastella kummankin sukupuolen minäkäsitystä ja liikunnan harrastusta myös erikseen. Esimerkiksi liikuntaa erittäin intensiivisesti harrastavista on tyttöjä edelleenkin hyvin pieni osa. Olisi mielenkiintoista tarkastella heidän minäkäsitystään ja sosiaalistumistaan liikuntaan käyttäen laadullisen tutkimuksen menetelmiä, joilla tämän ryhmän kokemuksista saataisiin tietoja. Tällaisella tiedolla saattaisi olla pedagogista merkitystä kun yritetään motivoida tyttöjä harrastamaan liikuntaa.

Noin 13-ikävuoteen asti mukana olo liikunnan harrastuksessa näyttäisi takaavan korkeat fyysisen pätevyyden kokemukset riippumatta todellisesta suorituskyvystä. Lasten ja nuorten liikunnan harrastusta tulisikin edistää kaikin tavoin, koska korkeat fyysisen pätevyyden kokemukset ovat tärkeitä liikuntamotivaation ja myöhemmän elämän jatkuvan liikunnan harrastuksen kannalta. Jatkossa tutkimuksissa tulisi keskittyä tarkastelemaan opetusmenetelmiä, joilla voitaisiin edistää kaikkien nuorten liikunnan harrastusta. Oppimisen motivaatioil-

maston säätelyyn liittyvät uudet ajatukset (Roberts, 1992) vaikuttavat lupaavilta tavoilta edistää lasten pätevyyskokemuksia. Jatkotutkimuksissa voitaisiinkin tutkia oppimisen motivaatioilmaston vaikutusta oppilaiden fyysisiin pätevyyskokemuksiin tässä tutkimuksessa kehitetyllä mittarilla.

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HOW IMPORTANT FOR YOU is , that YOU YOURSELF are:

(Choose the point which best suits to you)

	Is very important	Is some important	Is not important
To have good movement skills	1	2	3
To be agile	1	2	3
To be flexible	1	2	3
Not to tire easily	1	2	3
To be fast	1	2	3
To be strong	1	2	3
To be courageous	1	2	3
To be good-looking	1	2	3
Not too tall	1	2	3
Not too short	1	2	3
Not too skinny	1	2	3
Not too fat	1	2	3

MITEN TÄRKEÄÄ SINUSTA on se, että SINÄ ITSE olet:  
(Ympyröi sinuun sopiva vaihtoehto)

	On hyvin tärkeää	On jonkin verran tärkeää	Ei ole tärkeää
Taitava liikunnassa	1	2	3
Ketterä	1	2	3
Notkea	1	2	3
Kestävä	1	2	3
Nopea	1	2	3
Voimakas	1	2	3
Rohkea	1	2	3
Kivan näköinen	1	2	3
Ei liian pitkä	1	2	3
Ei liian lyhyt	1	2	3
Ei liian laiha	1	2	3
Ei liian lihava	1	2	3