

Participation in Organized Sport and Self-Esteem across Adolescence:  
The Mediating Role of Perceived Sport Competence

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## SPORT, COMPETENCE AND SELF-ESTEEM

### Abstract

The purpose of the study was to test longitudinal (two-year across three occasions) associations between sport participation (SP) and self-esteem (SE) across adolescence (10–18 years), addressing the mediating role of perceived sport competence (PSC) from a developmental perspective. Three waves of data were collected from three age cohorts (10–12, 13–15 and 16–18 years) of school-aged youth (N = 1358). The results demonstrate that SP and SE are related across time and that PSC has an important mediating role in this relationship, both from a skill-development and self-enhancement perspective. In the skill-development model, the mediating role of PSC was significantly stronger in the youngest cohort whereas the effect of PSC on subsequent SP in the self-enhancement model was significantly stronger in the 13-15 year age group compared with the youngest age group.

Keywords: *youth sport, skill-enhancement, self-enhancement*

**Participation in Organized Sport and Self-Esteem across Adolescence:  
The Mediating Role of Perceived Sport Competence**

Organized sports generally provide several elements of physical activities that are hypothesized to directly or indirectly facilitate self-esteem (Fox, 2000; Fox & Wilson, 2008). Achievements in youth sports often take place in an arena open to the public, with great opportunities for athletes to get instant feedback on their performances from significant people. The perception and interpretation of this feedback as being accurate, supportive and encouraging is also hypothesized to influence an individual's perceived athletic competence, and through different emotions affect his or her SE (Harter, 2012; Weiss & Ebbeck, 1996).

A person's global self-esteem (SE) or self-worth, defined as "...the overall evaluation of one's worth or value as a person" (Harter, 2012, p. 22–24), is considered to be one of the most central psychosocial constructs. High SE has been associated with emotional stability and adjustment to life demands (Sonstroem, 1997), subjective well-being, happiness, life satisfaction and resilience to stress (Diener & Diener, 1995). By contrast, low SE during adolescence has been found to predict poor health, criminal behaviour and limited economic prospects during adulthood (Trzesniewski et al., 2006).

Studies of a cross-sectional and retrospective nature have almost consistently shown that participants in organized youth sport, compared to non-participants, report having higher SE (e.g., Feldman & Matjasko, 2005; Findlay & Bowker, 2009). However, because of the design of these studies it has not been possible to determine whether these differences are an effect of SP *per se* or a result of other confounding variables (e.g., gender and age). Even though a cause and effect relationship cannot be fully established, longitudinal designs are better suited than cross-sectional ones when examining directions in the flow between, for example, SE and SP. Moreover, longitudinal designs offer substantial advantages when interpreting and drawing conclusions about mediating effects (Cole & Maxwell, 2003), in the

## SPORT, COMPETENCE AND SELF-ESTEEM

present study regarding the mediating effect of perceived sport competence (PSC) (i.e., a statement of personal ability that generalizes across the sport domain; Fox, 1997). Consequently, there has been growing interest in using longitudinal studies in this area, although such studies are still scarce.

Some researchers (e.g., Marsh & Kleitman, 2003; Slutzky & Simpkins, 2009) have found that participation in extramural sport is predictive of adolescents' SE development across time. In addition, it has been found that this can be generalized irrespective of gender (Findlay & Bowker, 2009). Based on the studies mentioned above, there seems to be some evidence that youths' participation in organized sports in general promotes SE development (e.g., Barber, Eccles & Stone, 2001; Fredricks & Eccles, 2006). However, the associations found between SP and SE are often quite weak. Consequently, it is of great importance to move on and further examine the factors that moderate this relationship in order to answer the question as to for whom and when is it stronger or weaker. Moreover, the inconsistent, or weak associations found also beg the question as to what kind of mediating factors, or mechanisms, are likely to influence the associations between SP and SE across time, that is, how or why does SP relate to SE and vice versa. Eccles, Barber, Stone & Hunt (2003) have pointed out the necessity of conducting longitudinal studies that "...are designed to evaluate specific theoretically based hypothesis about the mechanism likely to mediate the association between activity participation and development" (p. 868).

A large body of previous research has demonstrated that self-concept is a multifaceted, hierarchical construct (see Marsh & Shavelson, 1985 for a review). General self-concept (e.g., SE) is found at the apex, and perception of the self in broader domains (e.g., perceived physical competence) at the next underlying level, while perception of personal behaviour is found in specific domains (e.g., PSC) and finally, specific arenas activities/contexts (e.g., sport specific competence) are found at the base of the hierarchy (Shavelson, Hubner &

## SPORT, COMPETENCE AND SELF-ESTEEM

Stanton, 1976). Based on the structure of the hierarchical models, it should be hypothesized that involvement in specific behaviour (such as sport) will influence general SE (at the apex) through PSC at the midlevel (e.g., Sonstroem, Harlow & Josephs, 1994). However, the opposite direction of effects is also possible (Harter, 1978, 2012), that is, a higher SE will lead to more positive perceptions of specific subdomains (e.g., sport competence), which will result in a greater likelihood of engaging in specific behaviour (i.e., sport) that targets the specific self-perception (sport competence). These two contrasting pathways have been labelled skill-development and self-enhancement hypotheses (Marsh, 1990; Sonstroem, 1997).

Using the Exercise and Self-Esteem Model (EXSEM; Sonstroem, Harlow & Josephs, 1994) as a theoretical starting point the skill-development hypothesis suggests that people's SE is improved through participation in physical activities, such as organized sports, and is mediated by their physical self-concept (Sonstroem, 1997). Participation in sports is hypothesized to influence youths' PSC through the improvement of skills and competitive outcomes (game outcome, game performance statistics; Horn, 2004). Moreover, children and youths continuously interact with persons, objects and symbols in the sport environment and use these interactions as sources to judge their sport competence (e.g., peer comparison processes and evaluative feedback from coaches, parents, peers and spectators). To be effective, these interactions must occur on a fairly regular basis over extended periods of time for development to take place (Bronfenbrenner & Morris, 1998). In turn, theory suggests that changes in PSC subsequently generate psychological benefits that are mirrored in SE enhancement (Sonstroem, 1997). In sum, the EXSEM model suggests that participation in sports is related to changes in adolescents' SE through their sport self-concept (Sonstroem, 1997). Therefore, we hypothesize that participation in organized sport will be positively related to SE through changes in PSC.

## SPORT, COMPETENCE AND SELF-ESTEEM

Researchers have found some support for this model, showing positive relationships between participation in organized sports and perceived sport self-concept (e.g., Marsh & Jackson, 1986) and between PSC and SE (e.g., Coatsworth & Conroy, 2006; Spence, McGannon & Poon, 2005). Moreover, when analysing a combination of retrospective and contemporary data, Richman and Shaffer (2000) demonstrated that pre-college SP predicted SE, but only when it also promoted factors such as physical competence, body image and academic competence. In fact, when not accompanied by these links to SE, SP was negatively related to SE.

Although the EXSEM model is supported by previous research, there are a limited number of studies investigating the full model over an extended period of time using prospective data. In one of few longitudinal studies (a two wave-study involving 987 elementary school-aged children, on average 9.8 years of age), Slutzky and Simpkins (2009) found that team SP predicted children's sport self-concept enhancement one year later, which in turn was positively related to changes in SE the same year. Further analyses showed that children's gender, the perceived importance of sports, peer acceptance and mothers rating of their children's ability, did not moderate any associations between team SP, sport self-concept, and SE. These findings suggest that participation in team sports may have a positive effect on children's SE if they perceive themselves to be competent in sports, irrespective of gender, appraisal of sport competence and peer acceptance.

In contrast to the skill-development hypothesis and in compliance with other researchers who have used hierarchical models of self-concepts as a theoretical starting point, it has been suggested that people are also highly motivated to seek out tasks or situations in which they can demonstrate their abilities (see Harter, 2012 and Marsh, 2007). For example, according to this so-called self-enhancement hypothesis, a person with high SE and high perceived sport self-concept would be more motivated to seek out social contexts like

## SPORT, COMPETENCE AND SELF-ESTEEM

organized sports in order to demonstrate his or her skills in sports. In contrast, people with corresponding low sport self-perceptions may instead hesitate to participate in domains, such as sports, since the opportunity to demonstrate competence may be limited (Harter, 1978). Hence, the path from SE to behaviour would go in the opposite direction compared to the skill-enhancement hypothesis (SEH).

Research has consistently found strong support for the relationship between high levels of physical competence and participation in physical activities, while only marginal support has been noted for the causal role of SE (see Fox & Wilson, 2008 for a review). Although very sparse, most of the research done to test the path from SE to physical behaviour has been related to physical activities or performance in sport (e.g., Crocker et al., 2006), and only few studies (e.g., Sonstroem and Kampper, 1980) have tested the hypothesis in relation to SP. Moreover, studies testing differences in pathway directions have hardly been conducted, warranting more longitudinal and experimental investigations (Fox & Wilson, 2008). Thus, there is a need for studies examining the longitudinal relationships between SE, sport self-concept (i.e., PSC) and SP.

To sum up, there are two contrasting pathways working in different directions in the hierarchical network of self-concepts. This has led some theorists to endorse the reciprocal effect hypothesis (REH), proposing that self-concept is both a cause and a consequence of accomplishments in different arenas, such as organized sports (e.g., Marsh, 1990). However, the REH hypothesis and the studies that have tested the REH (e.g., Marsh & Craven, 2006; Marsh et al., 2007) have focused on the link between self-concept and accomplishment rather than between SP and SE and vice versa. Moreover, these previous studies have not addressed the mediating role of PSC in the longitudinal relationships between SP and SE that are assumed to play a vital role in theoretical models such as the EXSEM.

## SPORT, COMPETENCE AND SELF-ESTEEM

As leading developmental sport psychologists have highlighted, adoption of a developmental perspective should be emphasized when conducting research with children and youth in sport (see Horn, 2004 and Weiss & Raedeke, 2004); specifically, research exploring self-perceptual processes in the physical domain within the adolescent period is especially warranted (Horn, 2004).

During adolescence, a number of dramatic age-related developmental changes occur that affect the perception of the self (Harter, 2012; Horn, 2004), including physical changes, due to the entrance into puberty and cognitive-developmental advances (i.e., increasing emphasis on comparing oneself with others, noticing more subdomains and gradually integrating them in the self, changes in sources of information to judge one's perceived competence, increased accuracy of judging one's competence and accepting different perceptions of oneself across social contexts). In addition, self-perceptions are also altered due to age-related changes in the social environment (e.g., greater expectations from significant adults, changes in the way feedback is presented and how performances are judged (Harter, 2012; Horn, 2004) and transitions (Wigfield et al., 1991) across stages in the school-system (e.g., from elementary to junior high school).

Research related to SP and age have almost consistently shown that participation in organized sport is most salient in childhood and earlier adolescent years, while the highest attrition rate is often seen in the middle and late adolescent age span (i.e., 14–16 years). Thereafter, the dropout rate generally levels out (Findlay, Garner & Kohen, 2009). Findings related to PSC and normative trajectories during adolescence are however less clear. While some studies have found a decline with age (e.g., Fredricks & Eccles, 2002; Wigfield et al., 1991), others have found no such effects (Mañano, Ninot & Bilard, 2004; Marsh, 1998). With regard to SE, developmental studies have noticed a u-shaped trajectory showing a continuous decline starting in the pre-adolescent ages followed by an increase in the late adolescent years



## SPORT, COMPETENCE AND SELF-ESTEEM

(e.g., Wigfield et al., 1991), while others report no such change (Chubb et al. 1997), or even a decline through the adolescence period (Zimmerman et al., 1997).

Although some researchers have used a developmental perspective when studying age-related differences in SP, PSC and SE separately, to our knowledge no studies have adopted such a perspective in order to address the relationships between SP and SE across the adolescent period and the mediating role of PSC over an extended period of time. Hence, the main purpose of the present study was to test longitudinal associations between SP, PSC and SE in youths and differences across age groups at key periods of development (i.e., early, middle and late adolescent; 10–12, 13–15 and 16–18 years). Furthermore, we address the mediating role of PSC in the longitudinal associations between level of, and change in, SP and SE, both from a skill-development and self-enhancement perspective, as well as differences across age groups in these mediational processes.

In line with the skill-development model, we expected that higher SP at baseline would predict higher subsequent SE through higher subsequent PSC (the first hypothesis). According to self-enhancement model, we further expected that higher SE at baseline would positively predict subsequent SP through higher PSC (the second hypothesis). Although we expected the longitudinal associations between SP and SE and the mediating effect of PSC to exist across all three age cohorts, we also hypothesised that these pathways, and in particular the mediating role of PSC, would be most evident in the youngest age cohort (the third hypothesis). We base this hypothesis on previous developmental research (e.g., Harter, 2012; Horn, 2004) showing considerable developmental changes from early adolescence and onwards in systems and structures affecting SE and its link to behavior and perceived competence. For example, younger adolescents (here 10–12 years of age) tend to have a less diverse self-perception system, use fewer domains to base their SE on, and are less able to discount/devalue the importance of domains they fail in (thereby adjusting the impact on

## SPORT, COMPETENCE AND SELF-ESTEEM

behavior and outcomes on perceived competence). Given the hypothesized (see James, 1890, Harter, 1986) and documented (Harter, 1986, 2012; Lindwall et al., 2011) interaction between perceived importance of, and competence in, subdomains for general SE, the fewer self-subdomains and higher importance placed on SP in younger ages suggest that the link between SP and SE, also longitudinally, should be most evident in this younger age-group compared with 13–15 and 16–18-year-old adolescents. We therefore hypothesized that the longitudinal associations of SP and SE, and the mediating role of PSC in these associations, would be more evident in the youngest age-cohort (10–12 years of age), both when looking at skill-development and self-enhancement models.

### **Method**

#### **Participants and procedures**

The study employed a longitudinal cohort design, with three waves (T1 = year 1; T2 = year 2; T3 = year 3) of surveys. Although cause and effect relationships cannot be fully established, this design facilitates the identification of factors that precede change or non-change over time (de Vaus, 2001). In the present study, we included a sample of adolescents with a wide age range (e.g., 10–18 years) in order to cover as large a part of the adolescent period as possible. Moreover, the starting ages at T1 (10, 13 and 16 years) were strategically chosen to minimize the dropout rate, as pupils usually change schools at age 12 and 15 years. Data were collected each spring (2005–2007) from pupils attending at schools situated in the provinces of Värmland and Västra Götaland, located in the middle of Sweden. The sample was based on a three-step randomly stratified sampling procedure. In the first step, schools were selected while striving for equal distribution of primary, lower secondary and upper secondary schools. Second, classes were chosen at random within each school level. Third, it was decided to include 500 pupils in each stratum. Due to school administration problems at

## SPORT, COMPETENCE AND SELF-ESTEEM

the end of the semester, the total sample comprised 1,358 pupils, distributed almost equally over primary school ( $n = 465$ ), lower secondary school ( $n = 439$ ) and upper secondary school ( $n = 454$ ). A detailed flowchart of the study is presented in figure 1. The participation rate was high, including 1,174 participants at T1 (86%), 1,152 at T2 (85%) and 1,164 at T3 (86%). Due to reasons such as illness, travelling abroad and invalid absence, it was not possible to reach a minor part of the pupils at each wave. In the missing data analysis an independent sample t-tests were conducted to compare participants who completed all three waves of measurement ( $n=920$ ) with participants who were missing at least at one wave ( $n=438$ ) in regard to SP, PSC and SE at baseline (T1). The analysis showed significant differences between groups in relation to SP at T1 in favor of the full participation group ( $t_{(1356)} = 8.92$ ,  $p < .001$ ;  $M_{(920)} = 3.38$ ,  $M_{(438)} = 1.10$ ), but not in relation to PSC or SE at T1.

The mean baseline age of participants was 13.78 years ( $\pm 2.40$  years). Approximately 59% of the study participants were male and 41% were female (52% vs 48% at 10–12 years; 55% vs 45% at 13–15 years and 66% vs 34% at 16–18 years). The main reason for the gender imbalance was that boys dominated the high school programmes/classes (i.e., technical and practical) that were randomly assigned to the sample. The vast majority of participants (90%) were of Swedish background. The questionnaire was administered by a co-director of the project during school hours, which also made it possible to answer any questions from participants. Informed consent was obtained from parents, teachers and study participants. Ethics approval for the study was obtained from the Karlstad University Ethic Approval Committee.

### Measures

*Self-esteem and perceived sport competence.* A translated and modified version (a shortened six-item and a one-item-one-pole format) of Harter's (1985) Self-Perception Profile

## SPORT, COMPETENCE AND SELF-ESTEEM

for Children (SPPC) was used to assess self-esteem (SE) (3 items) (e.g. “I am happy with the way I am”) and perceived sport competence (PSC) (3 items) (e.g., “I am very good at sports”). Participants responded on a five-point Likert scale, ranging from *I strongly disagree* (1) to *I strongly agree* (5). The questionnaire was translated into Swedish using a structured translation-back-translation process (Geisinger, 2003). In this process, the questionnaire was translated from English into Swedish by a translator and then back-translated into English by a different translator. The scale was checked for differences between the English and Swedish versions and was adjusted accordingly. The psychometric qualities of SPPC have been well documented (e.g., Muris, Meesters & Fijen, 2003) and also held true for this adjusted scale, which showed good internal consistency across the three waves of data collection ( $\alpha$ -range .74 to .80 for SE and  $\alpha$ -range .80 to .86 for PSC). A ten-day test-retest was also conducted separately in a lower secondary class (n=24; M=13.0 years), showing strong stability for the SE ( $r_{tt} = .89$ ) and PSC scales ( $r_{tt} = .98$ ).

*Sport participation.* For the analysis in Mplus using latent variables, a latent factor of sport participation (SP) was constructed using two variables: one targeting how much time participants spent on average/week in their *single* most performed sport and the other how many hours he/she was involved in organized sport in total (including all sport activities) per week. Following the work done by Brettschneider and colleagues (e.g., Brettschneider & Gerlach, 2004), participants were asked to estimate how much time (hours) they spent in all of his/her organized sports clubs during a normal week (Monday to Sunday). For seasonal reasons participants were asked to fill in hours of participating in both February and May. Those who answered that they did not participate in any organized sports club at the moment were coded 0 h/week. A mean value of hours participating in sports was calculated for use in further analyses.

## Data analyses

## SPORT, COMPETENCE AND SELF-ESTEEM

Descriptive analyses across three age groups (10–12, 13–15, 16–18 years) were conducted in IBM SPSS (version 20). Differences in mean levels between the age groups in SP, PSC and SE at T1, T2 and T3 were analysed using analyses of variance (ANOVA). Cross-sectional correlations between latent constructs of SP, PSC and SE at T1, T2 and T3, controlling for measurement error, were performed in Mplus (version 7.1 Muthen & Muthen, 1998-2012). Two sets of mediational models were conducted: one skill-development mediational model targeting the indirect (mediational) effects of PSC at T2 on the effects of SP at T1 on SE at T3 and one self-enhancement model targeting the indirect effects of PSC at T2 on the effects of SE at T1 on SP at T3. Mediation analyses with bias-corrected bootstrapping were used, which is the most powerful and recommended method for obtaining confidence intervals for specific indirect effects (Preacher & Hayes, 2008). All mediation analyses were performed in Mplus using latent variables. Multigroup analyses were conducted to test for measurement invariance across age-groups and differences between age-groups in terms of strength of longitudinal associations (structural paths) in the mediation models. In the measurement invariance analyses, factor loadings and item intercepts were constrained to be equal across age-groups and the fit of this model was compared with a multigroup model with no constraints. Based on the recommendations of Cheung and Rensvold (2002) a decline in Bentler's comparative fit index (CFI) of less than .01 was interpreted as indication of invariance. The Wald Chi-Square test was used to formally test if the coefficients in the longitudinal mediation models were significantly different across age-groups.

Full information maximum likelihood estimation (FIML) was used to handle missing data and maximum likelihood parameter estimators with statistics that are robust to non-normality were used for all analyses. The following fit indices were used: (a) chi-square statistics, (b) Bentler's comparative fit index (CFI) and (c) the root mean square error of

## SPORT, COMPETENCE AND SELF-ESTEEM

approximation (RMSEA). The CFI is a normed incremental fit index (ranging from 0 to 1, with higher values indicating better fit) that measures the proportionate improvement in fit by comparing a target model with a more restricted baseline model (Hu & Bentler, 1999). In contrast, the RMSEA is an absolute fit index that does not rely on comparison with a reference model but rather measures the absolute misfit of a model, with lower values indicating better fit (Hu & Bentler, 1999). For CFI, values close to 0.95 or greater indicate a well-fitting model whereas values of 0.06 and less for the RMSEA indicate good model-data fit (Hu & Bentler, 1999).

### Results

#### Descriptive statistics

A large part of the sample was active in one or more sports at each time of measurement, but the participation rate in organized sport decreased over time (61% at T1; 59% at T2 and 52% at T3). Participants who took part in organized sport did so for an average of 5.13 ( $\pm$  4.06) hours per week at T1, 5.89 ( $\pm$  4.91) hours at T2 and 5.98 ( $\pm$  4.89) hours at T3. In total, sport participants were involved in 45 different sports, with the greatest involvement in soccer (40%), followed by equestrian activities (9%), ice-hockey (6%), floor-ball (5%) and golf (5%). Descriptive statistics for the main variables: sport participation (SP), perceived sport competence (PSC) and self-esteem (SE) at the three waves (T1–T3) are presented in Table 1.

#### Differences between age groups at T1, T2 and T3

Descriptive statistics across the three age groups for SP, PSC and SE at the three waves (T1–T3) are shown in Table 1. Significant differences between age groups in SP were found at both T1, [ $F(2,1357)=15.38$ ,  $p < .001$ ]; T2, [ $F(2,1357)=14.61$ ,  $p < .001$ ]; and T3, [ $F(2,1357)=8.51$ ,  $p < .001$ ]. SP was higher among the 13–15 year age group compared to the

## SPORT, COMPETENCE AND SELF-ESTEEM

10–12 and 16–18 year age groups both at T1 and T2 ( $ps < .05$ ). At T3, both the 10–12 and 13–15 year age groups were more active compared to the 16–18 year age group ( $ps < .05$ ). In terms of PSC, there were also significant differences between the groups at T1, [F(2,1170)=19.38,  $p < .001$ ]; T2, [F(2,1170)=15.41,  $p < .001$ ]; and T3, [F(2,1170)=5.30,  $p < .001$ ]. The youngest age group (10–12) reported lower PSC at all three waves compared to the 13–15 and 16–18 year age groups ( $ps < .05$ ). Significant differences between age groups in SE were only found at T1, [F(2,1170)=6.77,  $p < .001$ ], but not at T2 or T3. At T1, the 10–12 year age group reported significantly higher SE compared to the 16–18 year age group ( $p < .001$ ).

### **Cross-sectional correlations between latent constructs at T1, T2 and T3**

The model including latent constructs of SP, PSC and SE at all three waves fit data well for all three age groups.<sup>1</sup> SP was moderately ( $rs = .32 - .54$ ,  $ps < .001$ ) associated with PSC and weakly associated with SE ( $rs = .07 - .28$ ,  $ps < .001$ ) across the three waves. Finally, PSC was moderately to strongly associated with SE relationships ( $rs = .66 - .44$ ,  $p < .001$ ).

### **The mediating role of perceived sport competence**

The multigroup mediation models constraining factor loadings and intercepts to be invariant across age-groups made acceptable fit to data, both for the skill-development ( $\chi^2(49) = 146.67$ ,  $p < .001$ ; CFI = .974; RMSEA = .066 (90% CI = .054 to .079) and self-enhancement models ( $\chi^2(49) = 101.44$ ,  $p < .001$ ; CFI = .983; RMSEA = .049 (90% CI = .035 to .062). Moreover, the drops in CFI compared with the models with no constraints were less than .01. Therefore, strong measurement invariance was supported for the mediation models and the constrained models were used for the main analyses reported below.

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<sup>1</sup> 10–12 years:  $\chi^2(140) = 182.66$ ,  $p < .001$ ; CFI = .990; RMSEA = .026 (90% CI = .013 to .035); 13–15 years  $\chi^2(140) = 230.53$ ,  $p < .001$ ; CFI = .984; RMSEA = .038 (90% CI = .029 to .047) and 16–18 years  $\chi^2(140) = 223.39$ ,  $p < .001$ ; CFI = .985; RMSEA = .036 (90% CI = .027 to .045)

## SPORT, COMPETENCE AND SELF-ESTEEM

The mediating effects of levels of PSC (at T2) in the associations between level of SP at T1 and level of SE at T3 (skill-development mediation model), and SE at T1 and SP at T3 (self-enhancement mediation model), are demonstrated across age groups in Table 3. The total effects were significant and positive for both the skill-development and self-enhancement models across all three age groups, indicating a total effect both from SP at T1 to SE at T3 (through PSC at T2) as well as from SE at T1 to SP at T3 (through PSC at T2), supporting both the skill-development and self-enhancement mediational models. The direct effects of the independent variable (SP at T1 for skill-development model and SE at T1 for self-enhancement model) on the dependent variable (SE at T3 for skill-development model and SP at T3 for self-enhancement model) were non-significant when PSC was included in the model for all models.

Looking at the specific paths of the skill-development model, the effects of SP at T1 on PSC at T2 were significant for all age groups ( $\beta = .13 - .25, ps < .001$ ), but significantly stronger for the 10–12 age group, compared with the 13–15 year group (Wald chi square (1) = 7.18,  $p < .01$ ) and the 16–18 year group (Wald chi square (1) = 11.26,  $p < .01$ ). The effects of PSC at T2 on SE at T3 were also significant for all age groups ( $\beta = .32 - .43, ps < .001$ ). Based on the bootstrap results, the indirect effects of PSC at T2 were significant for all age groups, as the confidence intervals did not include 0. As a consequence of the stronger effects of SP at T1 on PSC at T2, and PSC at T2 on SE at T3 for the 10–12 year age group, the indirect effects of PSC were also significantly stronger in this younger age group (95% CI = 0.08 – 0.19) compared to the 13–15 (95% CI = 0.03 – 0.08; Wald chi square (1) = 5.80,  $p < .05$ ) and 16–18 (95% CI = 0.02 – 0.06; Wald chi square (1) = 8.07,  $p < .01$ ) year age groups.

In the self-enhancement model, the effects of SE at T1 on PSC at T2 were significant and very similar for all age groups ( $\beta = .61 - .63, ps < .001$ ). The effects of PSC at T2 on SP at T3 were also significant for all age groups ( $\beta = 1.05 - 1.62, ps < .001$ ). This effect was



## SPORT, COMPETENCE AND SELF-ESTEEM

significantly (Wald chi square (1) =3.88  $p < .05$ ) stronger in the 13-15 year age group compared with the 10-12 year age group. The bootstrap results demonstrated significant indirect effects of PSC at T2 for all age groups, with confidence intervals outside 0.

From a skill-development perspective, these results generally mean that more SP at T1 predicts more positive SE at T3 through higher PSC at T2. Similarly, from a self-enhancement perspective, SE at T1 predicts more SP at T3 through increased higher PSC at T2.

### Discussion

The primary aim of this study was to examine the longitudinal associations (based on both the skill-development and self-enhancement models) between youth's sport participation (SP), perceived sport competence (PSC) and self-esteem (SE), particularly addressing the mediating role of PSC at crucial phases of human development (i.e., early, middle and late adolescence). This approach expands previous research in several ways. Most of the studies that have tested the relationship between SE and different aspects of physical activities (e.g., the Exercise and Self-Esteem Model, EXSEM; Sonstroem et al., 1994) have focused on the relationship between SE and accomplishment (e.g., Marsh & Craven, 2006; Marsh et al., 2007) or physical activities in general (e.g., Crocker et al., 2006) rather than participation in organized sport. Moreover, few studies (e.g., Slutzky & Simpkins, 2009) have addressed the mediating role of PSC in the longitudinal relationships between SP and SE, and to our best knowledge no other study has adopted a developmental perspective while examining these associations.

Although not part of the main purpose of the study, it first should be noted that the results indicate differences between age groups in terms of levels at the three waves of the three main constructs of the study (SP, PSC and SE), pointing to the relevance of using a

## SPORT, COMPETENCE AND SELF-ESTEEM

developmental perspective and stratifying the analyses by age groups. For example, across the three waves, SP was highest in the 13–15 year age group and lowest in the oldest 16–18 year age group. These results are generally in line with previous work (Findlay, Garner & Kohen, 2009) indicating an increase in SP from early adolescence up to middle adolescence and then a subsequent decline. In contrast to some findings (Fredricks & Eccles, 2002; Wigfield et al., 1991), but in line with others (e.g., Zimmerman et al., 1997), the PSC was lower in the youngest age group compared with the two older age groups. Results related to the normative development of SE did not show any clear pattern, although the youngest age group did display higher SE at T1, which to some extent supports the trend demonstrated in previous work (e.g., Wigfield et al., 1991) that SE is higher in late childhood and early adolescence, then declines throughout middle adolescence and thereafter, recovers in late adolescence.

Looking at the cross-sectional associations between the latent constructs of SP, PSC and SE, it seems clear that the weakest link in the chain between the three concepts is the SP-SE relation. Generally, the cross-sectional SP-SE correlations were significant but weak across age groups and waves, supporting previous studies showing that there is a weak association between SP and SE (e.g., Fox, 2000; Spence, McGannon & Poon, 2005). Part of the reason for this may be attributed to the fact that specific behaviours (e.g., sport or exercise participation) is thought to have the greatest influence at the closest level in the self-concept hierarchy (e.g., self-efficacy and perceived competence in sport), and then successively levelling out when moving further up in the hierarchy (Harter, 2012; Shavelson et al., 1976).

As suggested by Fox (2000), the weak associations between exercise and SE may also demonstrate that confounding or mediating factors are present. When examining the mediating role of PSC and the presumable moderating effects of age in the SP-SE relationship, results supported our first and second hypotheses. In other words, PSC mediated the effect of SP on subsequent SE, and similarly the effect of SE at baseline on subsequent SP

## SPORT, COMPETENCE AND SELF-ESTEEM

across all three age groups. These results highlight the importance of considering PSC as a mediating variable for understanding the mechanisms behind the associations of SP and SE development. Moreover, as suggested by Marsh and Craven (2006) and Fox (2000) and in line with previous research by Slutzky and Simpkins (2009), the results indicate that SP may not enhance later SE unless it also promotes PSC. From a broader theoretical self-concept perspective, the mediating effect of PSC, situated on a midlevel between SP (on a more specific/behaviour level) and general SE (at the top level), supports mediational self-perception models where behaviour (exercise) is related to general self-worth through perceived competence in subdomains, such as the EXSEM (see Sonstroem, 1997). Also, these results are in line with the multidimensional and hierarchical self-concept structure suggested by other researchers (e.g., Harter, 2012; Marsh, 2007; Shavelson, Hubner & Stanton, 1976).

The significant indirect effects of PSC demonstrated in both the skill-development and self-enhancement models and across all age groups may be interpreted as supporting a robust invariant mediating effect of PSC across adolescence. However, by closer inspection it was also clear that there seemed to be an interaction between age group and direction of effects (skill-development vs. self-enhancement) in the indirect effect of PSC, that is, the mediational role of PSC as well as the different paths constituting the mediational effect were more or less evident across different age groups and across the skill-development vs self-enhancement models. More specifically, supporting our third hypothesis, the longitudinal mediating effect of PSC in the skill-development model (SP at T1 influencing PSC at T2 that in turn affects SE at T3) was significantly stronger in the youngest age group.

In terms of the more evident mediational effect of PSC in the skill-development model for the younger age group, perceived competence is less accurate and realistic in younger ages (Harter, 2012; Horn, 2004), and the expectations from the environment (e.g., coaches and parents) may be lower, which may lead to a stronger relationship between SP and PSC. Also,

## SPORT, COMPETENCE AND SELF-ESTEEM

in the ages 10–12, the self-system (including SE) is based on fewer subdomains which leads to the notion that the fewer subdomains, which are pertinent in this age (e.g., sport), should have a stronger impact on general evaluations of SE as these subdomains are deemed to be more important (see Harter, 2012; Lindwall et al., 2011). Altogether, these differences across development and age groups in the self-system as well as in the environment may to some extent explain the stronger role of PSC in the skill-development models for the youngest age group.

From a self-enhancement perspective, addressing the influence of SE at T1 on SP at T3 through PSC at T2, although the total mediating effect of PSC did not differ significantly across age-groups, the specific path from PSC at T2 to SP at T3 was significantly stronger in the 13-15 year age group compared to the 10-12 year old age group. Compared to the youngest age group, 13–15-year-old adolescents are generally more sensitive towards experiences of failure and how others perceive them (see Harter, 2012). Given the entrance into puberty, the importance of self-presentation/impression management and choosing behaviors that may encompass safe routes to demonstrations of competence rather than signalling incompetence to significant others (primarily peers) should then be more evident. Moreover, not only may adolescents in this age be more sensitive towards failing to demonstrate competence towards others, they should also have started to establish a greater autonomous relationship to their parents (Allen et al., 1994), and subsequently be more able to actively choose and seek out physically “competent-safe” environments themselves instead of being more controlled by parents as in the 10–12-year-old group (Smith, 2003; Horn & Weiss, 1991). Consequently, those who perceive themselves to be competent at sports may to a greater extent choose organized sport as an arena to excel in, while others with weaker PSC will choose other competence enhancement arenas that perhaps are more suitable to their other competencies and interests (e.g., music, academics and videogames).

### **Limitations**

Although the present study included a large sample consisting of age groups across the whole adolescence period, a longitudinal design with several measurement points and recommended state-of-the-science analytical approaches for investigating mediational processes across time, several limitations should be highlighted. For example, the measurements of SP were self-reported and may thus be biased. Moreover, the latent factor of SP was modelled using two items where one (total hours in primary sport per week) was included in the other (total hours in all sports per week), which is a potential weakness of the study. Also, the measurements of sport participation used in the present study only covered time spent in sports, and not variations in terms of demands or other qualities of the sport engagement that also may have an impact on the association between SP, SE and PSC. Future studies would therefore benefit from using more differentiated measures of SP such as structured training logs. Moreover, in the present paper true intra-individual change trajectories and differences in change trajectories across age groups were not targeted. Since changes in adolescent's self-perceptions are associated with age related changes caused by the complex inter-relationships between cognitive, physical and socioenvironmental factors (see Weiss & Raedeke, 2004), future research would benefit by using an explicit developmental perspective and examining whether differences in intra-individual change and associations of change exist between different adolescent age groups (i.e., early, middle and late adolescence; Harter, 2012).

Moreover, as multidimensional and hierarchical self-concept models imply (e.g., Shavelson et al., 1976), the structure of self-concepts include several levels and domains, and relations between those concepts have not been addressed in this study (e.g., relations between perceived sport competence and domain-specific self-assessments such as physical

## SPORT, COMPETENCE AND SELF-ESTEEM

self-worth and individuals' assessments in specific sport contexts and in specific sport situations).

### **Conclusion**

To sum up, the mediating role of perceived sport competence (PSC) in the longitudinal association between sport participation (SP) and self-esteem (SE) was evident both from a skill-development and self-enhancement perspective. It was also evident that PSC may not play equally strong part as a mediator in the longitudinal associations between SP and SE across age groups in the adolescence period and that these differences in how PSC as a mediator plays out across age groups also depend on which directional perspective one has in the association of SP and SE (i.e., from SP to SE or the reverse). In other words, longitudinally, the associations between SP, PSC and SE seem not to be invariant but quite dynamic across age; moreover, very likely there are time-windows throughout the course of adolescence where the associations between SP, PSC and SE (and the role of PSC as a mediator between SP and SE) get stronger or weaker, depending on interactions between biological, psychological and social transitions.

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Table 1

*Descriptive Statistics at the Three Waves (T1, T2 and T3) across the Three Age-groups for Sport Participation (SP), Self-Esteem (SE), and Perceived Sport Competence (PSC)*

Variables	Age-groups								
	10-12 years			13-15 years			16-18 years		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
SP (T1)	465	2.12	2.61	439	3.44	4.37	454	2.33	4.26
SP (T2)	465	2.62	3.73	439	3.44	5.03	454	1.92	3.77
SP (T3)	465	2.73	4.18	439	2.90	4.52	454	1.82	4.03
PSC (T1)	388	2.69	1.04	391	3.14	1.09	392	3.08	1.11
PSC (T2)	413	2.78	1.10	389	3.17	1.14	348	3.16	1.10
PSC (T3)	405	2.77	1.19	398	3.00	1.20	360	3.00	1.12
SE (T1)	388	3.87	.82	391	3.73	.84	392	3.66	.80
SE (T2)	412	3.74	.83	389	3.71	.87	349	3.78	.80
SE (T3)	405	3.74	.87	398	3.65	.91	360	3.79	.86

SPORT, COMPETENCE AND SELF-ESTEEM

Table 2

*Mediating Effects of (Levels of) Perceived Sport Competence in the Relationships Between Sport Participation T1 and Self-Esteem T3 and Between Self-Esteem T1 and Sport Participation T3*

Model	IV T1 to PSC T2 <sup>a</sup>	PSC T2 to DV T3 <sup>b</sup>	Total effect of IV T1 on DV T3 <sup>c</sup>	Direct effect of IV T1 on DV T3 <sup>d</sup>	Bootstrap results for indirect effect <sup>e</sup>
	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)	$\alpha\beta$ (SE) (95% CI)
Skill-development model	0.15** (0.02)	0.36** (0.04)	0.04** (0.01)	-0.01 (0.01)	0.05 (0.01)** (0.04-0.07)
10-12	0.25** <sub>a</sub> (0.03)	0.43** <sub>a</sub> (0.06)	0.09** <sub>a</sub> (0.03)	-0.02 <sub>a</sub> (0.03)	0.11 (0.02)** <sub>a</sub> (0.08-0.19)
13-15	0.15** <sub>b</sub> (0.02)	0.33** <sub>a</sub> (0.05)	0.05** <sub>b</sub> (0.01)	0.00 <sub>a</sub> (0.02)	0.05 (0.01)** <sub>b</sub> (0.03-0.08)
16-18	0.13** <sub>b</sub> (0.02)	0.32** <sub>a</sub> (0.06)	0.03* <sub>b</sub> (0.01)	-0.01 <sub>a</sub> (0.01)	0.04 (0.01)** <sub>b</sub> (0.02-0.06)
Self-enhancement model	0.59** (0.06)	1.30** (0.15)	0.98** (0.18)	0.21 (0.20)	0.77 (0.11)** (0.57-1.01)
10-12	0.61** <sub>a</sub> (0.10)	1.05** <sub>b</sub> (0.24)	0.76** <sub>a</sub> (0.34)	0.12 <sub>a</sub> (0.39)	0.64 (0.18)** <sub>a</sub> (0.21-0.96)
13-15	0.63** <sub>a</sub> (0.10)	1.62** <sub>a</sub> (0.21)	1.23** <sub>a</sub> (0.33)	0.21 <sub>a</sub> (0.35)	1.02 (0.20)** <sub>a</sub> (0.52-1.37)
16-18	0.61** <sub>a</sub> (0.11)	1.22** <sub>ab</sub> (0.22)	0.78** <sub>a</sub> (0.30)	0.03 <sub>a</sub> (0.31)	0.75 (0.19)** <sub>a</sub> (0.38-1.25)

*Note:* All variables are latent factors. Skill-development model= Sport participation T1→Sport competence T2→Self-esteem T3; Self-enhancement model = Self-esteem T1→Sport competence T2→Sport participation T3. IV= Independent variable; DV=dependent variable; PSC=Perceived sport competence; SE= standard error. <sup>a</sup>Independent variable to mediator (a path); <sup>b</sup>Direct effect of mediator on dependent variable (b path); <sup>c</sup>Total effect of independent variable on dependent variable (c path); <sup>d</sup>Direct effect of independent variable on dependent variable (c-prime path). <sup>e</sup>Bootstrap results based on 5000 resamples.

Adj. R square dependent variables: age 10-12 Sport participation T3=.07; Self-esteem T3=.24; age 13-15 Sport participation T3=.25; Self-esteem T3=.17; age 16-18 Sport participation T3=.14; Self-esteem T3=.16.

Estimates within each column that do not share the same subscript across age-groups are significantly different at p<.05 as indicated by the Wald Chi-Square test in Mplus.

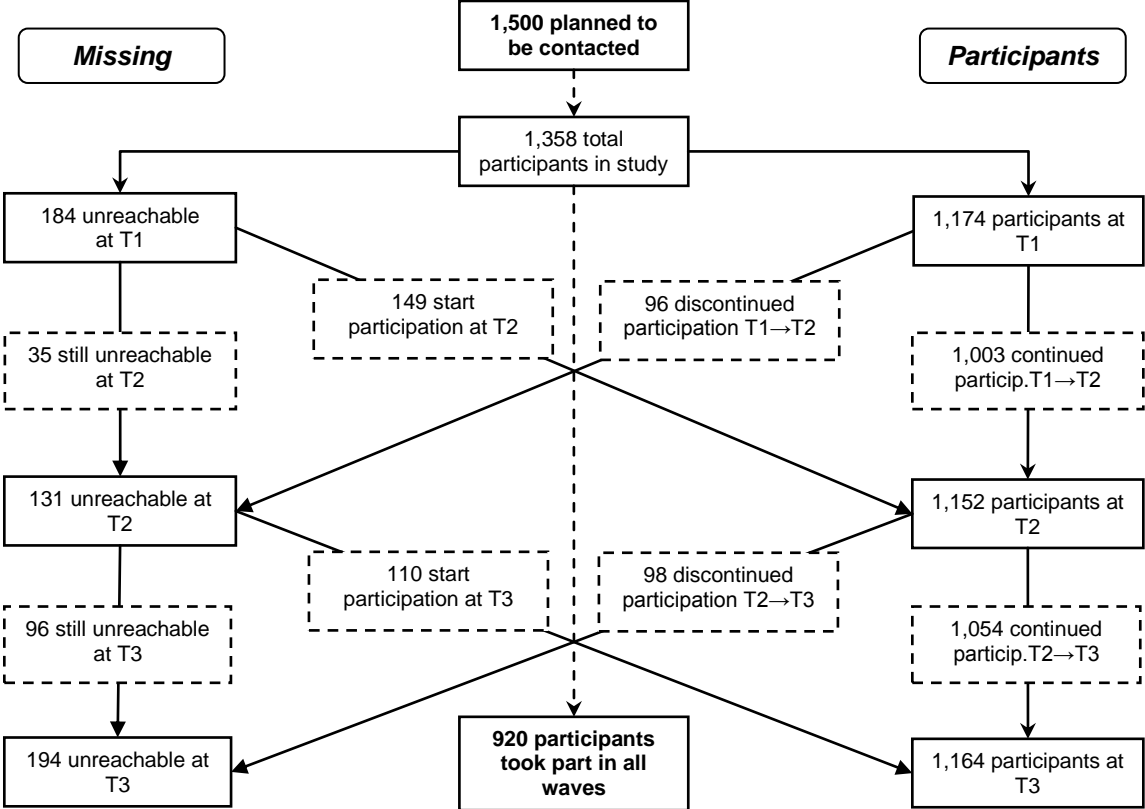


Figure 1. Flowchart of the study (T1=year 1; T2=year 2; T3=year 3).