

Laura Pesu

The Role of Parents' and Teachers' Child-Related
Competence Beliefs in The Development of
Students' Self-Concept of Ability



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ABSTRACT

Pesu, Laura Annukka

The role of parents' and teachers' child-related competence beliefs in the development of students' self-concept of ability

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Individuals' perceptions about their abilities, that is, self-concepts of abilities, are crucial determinants of academic achievement and education-related choices. The aims of this research were to examine the role of parents' and teachers' beliefs about children's abilities in students' self-concept of ability in the domains of literacy and mathematics, and whether the role of parents and teachers is different among boys and girls, and among low- and high-performing students. These questions were examined using three different data sets: the LIGHT study, the Jyväskylä Entrance into Primary School (JEPS) study and the STAIRWAY study. In all three studies, the participants were Finnish. In the Light study, the participants were first-grade students, in the JEPS study lower secondary school students and the STAIRWAY study sixth- and seventh-grade students. Among the first-graders, the results showed that the beliefs of teachers', in particular, predicted the development of students' self-concept of ability in both literacy and mathematics, but only among high-performing students: the higher a teacher's beliefs about a high-performing student's abilities at the beginning of the first grade, the better that student's self-concept of ability at the end of the first grade. Among the lower secondary school students, both mothers' and fathers' beliefs positively predicted students' subsequent self-concept of mathematics ability, although the impact of mothers' beliefs was stronger among high-performing than low-performing students. Among students transiting from primary to lower secondary school, mothers' beliefs about their children's abilities positively predicted the development of students' self-concept of ability in mathematics, although the impact was stronger among high-performing than low-performing students. Gender did not moderate the associations between parents' and teachers' beliefs and students' self-concept of ability in any of the three studies. Overall, the results suggest that teachers and parents play an important role in the development of students' self-concepts of abilities. It would be important to take these findings into account when planning how best to support students and their developing self-concepts.

Keywords: self-concept of ability, mothers' beliefs, fathers' beliefs, teachers' beliefs, mathematics, literacy

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TIIVISTELMÄ (FINNISH ABSTRACT)

Pesu, Laura Annukka

Vanhempien ja opettajien lapsen taitoja koskevien uskomusten yhteydet lapsen oppijaminäkuvan kehitykseen

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Käsitys omista taidoista ja kyvyistä eri oppiaineissa eli oppijaminäkuva on yhteydessä oppilaan koulumenestykseen, kurssivalintoihin ja ammattiin liittyviin valintoihin. Tässä tutkimuksessa tarkasteltiin, miten vanhempien ja opettajien uskomukset oppilaan kyvyistä ovat yhteydessä oppilaan myöhempään oppijaminäkuvaan äidinkielessä ja matematiikassa. Lisäksi selvitettiin, onko vanhempien ja opettajien uskomusten rooli erilainen tytöillä kuin pojilla tai taitotasoltaan heikommilla kuin hyvillä oppilailla. Aihetta tutkittiin kolmella eri aineistolla: Vanhemmat, lapset ja oppiminen (VALO), Koulutaidot ja motivaatio (JEPS) sekä TIKAPUU-tutkimusten aineistoilla. VALO-tutkimuksessa oppilaat olivat suomalaisia alakoulun ensimmäisellä luokalla olevia oppilaita, JEPS-tutkimuksessa suomalaisia yläkoululaisia ja TIKAPUU-tutkimuksessa suomalaisia kuudes- ja seitsemäsluokkalaisia. Tutkimustulokset osoittivat, että alakoulun ensimmäisellä luokalla olevilla oppilailla opettajien uskomukset olivat yhteydessä lasten oppijaminäkuvaan niin äidinkielessä kuin matematiikassakin, mutta ainoastaan taitotasoltaan hyvillä lapsilla. Mitä vahvemmin opettaja uskoi lapsen kykyihin ensimmäisen luokan alussa, sitä myönteisempi oli lapsen myöhempi oppijaminäkuva ensimmäisen luokan lopulla taitotasoltaan hyvillä lapsilla. Taitotasoltaan heikkomat lapset eivät vastaavassa määrin hyötäneet opettajan myönteisistä uskomuksista. Vanhempien uskomukset eivät olleet yhteydessä ensimmäistä luokkaa käyvien lasten oppijaminäkuvassa tapahtuviin muutoksiin. Tutkimustulokset osoittivat myös, että yläkoululaisilla äitien ja isien uskomukset lastensa kyvykkyydestä olivat positiivisesti yhteydessä lasten oppijaminäkuvaan matematiikassa. Äitien uskomusten yhteys oli voimakkaampi taitotasoltaan hyvillä lapsilla kuin taitotasoltaan heikoilla lapsilla. Äitien uskomukset ennustivat myös matematiikan oppijaminäkuvassa tapahtuvaa muutosta siirryttäessä alakoulusta yläkouluun, mutta lapsen taitotaso muovasi äitien uskomusten ja lasten oppijaminäkuvan yhteyttä. Vaikka lasten matematiikan oppijaminäkuva keskimäärin heikkeni siirtymävaiheessa, äitien positiiviset uskomukset lastensa kyvyistä suojasivat minäkuvan laskulta erityisesti niiden oppilaiden kohdalla, jotka olivat taidoiltaan hyviä. Kaikki kolme osatutkimusta osoittivat, että vanhempien tai opettajien uskomusten ja oppilaiden oppijaminäkuvan välisissä yhteyksissä ei ollut eroja tyttöjen ja poikien välillä. Tutkimus antaa viitteitä siitä, että sekä opettajat että vanhemmat ovat merkittäviä lasten oppijaminäkuvan kehittymisen kannalta. Tämä on tärkeä ottaa huomioon lasten ja nuorten minäkuvan kehitystä tukevia toimia suunniteltaessa.

Avainsanat: oppijaminäkuva, äitien uskomukset, isien uskomukset, opettajien uskomukset, matematiikka, äidinkieli

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Jyväskylä 30.1.2017

Laura Pesu

LIST OF ORIGINAL PUBLICATIONS

This research is based on the following three original studies which are referred to in the text by their roman numerals.

- I Pesu, L., Viljaranta, J., & Aunola, K. (2016). The role of parents' and teachers' beliefs in children's self-concept development. *Journal of Applied Developmental Psychology, 44*, 63-71.
- II Pesu, L., Aunola, K., Viljaranta, J., & Nurmi, J.-E. (2016). The development of adolescents' self-concept of ability through grades 7-9 and the role of parental beliefs. *Frontline Learning Research, 4*, 92-109.
- III Pesu, L., Aunola, K., Viljaranta, J., Hirvonen, R., & Kiuru, N. (2016). The role of mothers' beliefs in students' self-concept of ability development. Submitted manuscript.

Taking into account the instructions given and comments made by the co-authors, the author of this dissertation planned the research frame, conducted the analyses, and wrote the reports of all three publications.

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TIIVISTELMÄ (FINNISH ABSTRACT)

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1 INTRODUCTION

Previous research has consistently shown that students' self-concept of ability, that is, the individuals' perceptions of their competence in different academic domains, such as mathematics or literacy (Eccles, 2005; Wigfield & Eccles, 2000), direct their behavior and effort in learning situations (e.g., Atkinson 1964; Bandura 1986; Eccles et al. 1983; Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean 2006) by influencing, for example, their course enrollment and subsequent achievement (Bouchey & Harter, 2005; Eccles et al., 1983; Marsh & Martin, 2011; Meece, Wigfield, & Eccles, 1990; Watt, 2004). Valentine, DuBois and Cooper (2004) showed in their review that whereas general self-beliefs had a slight positive effect on academic achievement, the effects of self-beliefs on achievement were stronger in specific academic domains, such as mathematics. Self-concept of ability has also been shown to play a role in the choice of college major (Musu-Gillette, Wigfield, Harring, & Eccles, 2015). Musu-Gillette et al. (2015) found that students whose self-concept in mathematics was high were more likely to choose a mathematics-intensive major in college. Because school-related experiences form a crucial part of children's lives and shape their life courses and educational paths, it is important to understand how children perceive themselves and their academic skills, and find ways that best support children with different self-perceptions.

Self-concept of ability can be regarded as a malleable perception (Gniewosz, Eccles, & Noack, 2012) that is affected by multiple sources of information (Skaalvik & Skaalvik, 2002), such as grades and parental (Frome & Eccles, 1998; Gniewosz et al., 2012) and teachers' child-related competence beliefs (e.g., Madon et al., 2001). It has been suggested that the role of parents and teachers in students' self-perceptions, are different at different ages (Gniewosz et al., 2012). Gniewosz et al. (2012), for example, found that the effects of maternal child-related competence beliefs on students' mathematics and English self-concept increased during the secondary school transition, whereas the effect of grades on students' mathematics and English self-concept decreased. Besides age, cultural as well as individual differences may impact on self-concept development. The aim of this research was to examine the extent to which parents' and teach-

ers' beliefs about children's abilities are associated with Finnish children's self-concept development in mathematics and literature during the first grade of primary school, during the transition to lower secondary school, and during the lower secondary school years. This research expands the literature on the topic by investigating the possible role of students' gender and level of performance in the connections between adults' beliefs and students' perceptions of their ability.

1.1 Self-concept of ability

In the literature, various concepts have been used to define achievement-related beliefs, such as "perceived competence" (Harter, 1982), "academic self-concept" (Marsh, 1989), and "self-concept of ability" (e.g., Eccles, 2005; Nurmi & Aunola 2005). While these definitions all refer to students' own understanding of their abilities and competencies in academic situations or in a particular subject area (for a review, see Bong & Skaalvik, 2003), there are also some differences between them.

Self-concept of ability has been defined as an individual's perception of his or her current competence in different domains (Eccles, 2005; Wigfield & Eccles, 2000). The term *academic self-concept* has been used in the same meaning as self-concept of ability when referring to an individual's perceptions of his or her competence not only in different academic domains but also in overall academic ability (Marsh, 1989). Similarly, *perceived competence* has also been used to describe the same phenomenon as self-concept of ability and academic self-concept as it has been defined as person's perception of his/her competence (Harter, 1982). In the expectancy-value theory (Eccles, 2005), another concept, in addition to the concept of self-concept of ability, is used. This concept is *expectancy of success* which refers to expectations of success in an individual's future tasks, while the term self-concept of ability focuses on current abilities (Eccles, 2005; Wigfield & Eccles, 2000). However, empirically these two concepts have not been found to be distinct (Eccles & Wigfield, 1995).

In earlier research on individuals' self-perceptions, the emphasis was on a global construct, such as general self-concept or self-esteem (for a review, see Bong & Skaalvik, 2003); however, the notion that self-concept is global in nature has since been criticized for overlooking the apparent distinctions that children make between activity domains (Harter, 1982). Shavelson, Hubner and Stanton (1976) proposed a multidimensional, hierarchical model of self-concept, with global self-concept at the apex, that can be subdivided into academic and non-academic components. These in turn can be divided into subdomains; that is, academic self-concept can be divided into self-concepts pertaining to specific school subjects, and nonacademic self-concept into physical, social and emotional self-concepts.

Other commonly used concepts in the research on self-perceptions are *self-esteem* and *self-efficacy* (Bandura, 1997). *Self-efficacy* has been defined as one's

perceived capability to organize and execute actions that are required to produce a given attainment (Bandura, 1997). Self-efficacy primarily comprises cognitive assessments of one's abilities (Bong & Clark, 1999; Bong & Skaalvik, 2003) whereas self-concept comprises both cognitive and affective responses. The research on self-efficacy has a relatively short history compared to self-concept research (Bong & Skaalvik, 2003). Self-efficacy researchers have tended to focus on how confident individuals are about completing different tasks rather than asking individuals to compare their efficacy to that of others (Pajares, 1996). *Self-esteem* (that is, the individual's global positive or negative attitude toward himself; Simmons, Rosenberg, & Rosenberg, 1973), in turn, has been described as evaluations of the descriptive components of self-concept (Beane & Lipka, 1980; Brinthaupt & Erwin, 1992). Valentine et al. (2004, p. 112) pointed out that "theoretically, self-concept, self-esteem, and self-efficacy beliefs share a common emphasis on an individual's beliefs about his or her attributes and abilities as a person".

In this research the focus was on self-concept that concerns academic abilities, and hence the construct self-concept of ability is deployed. The term self-concept of ability is used to refer to individuals' perception of their current competence in different domains (Eccles, 2005; Wigfield & Eccles, 2000)

1.2 Theories on self-concept of ability

1.2.1 Expectancy-value model of Eccles et al.

The expectancy-value model (Eccles, 2005; Eccles et al., 1983; Wigfield & Eccles, 2000) is based on the early work of Atkinson (1964). The expectancy-value model focuses on students' self-perceptions in the academic context. According to the model, individuals' performance and academic choices are explained by the extent to which they value the activity in question and by the beliefs they have about their academic abilities (expectancies for success). Expectancies have been found to have a direct effect on different academic outcomes, such as task performance and course enrollment (Wigfield & Eccles, 2000). Moreover, self-concept of ability and the perceived difficulty of a task are assumed to influence expectancies for success.

Studies using the expectancy-value model as a theoretical framework have demonstrated that even in very young children (first-graders) self-concepts of their abilities differ across different activities: for example, children have distinct self-concepts for specific school domains (Eccles et al., 1993). Already in the first grade, children have been shown to make distinctions between different domains in their self-concept ratings, meaning that an individual's self-concepts of ability in mathematics, reading, music and sports, for example, form clearly distinct factors (Eccles et al., 1993).

1.2.2 Marsh's internal/external frame of reference model

Alongside the expectancy-value model of Eccles et al. (Eccles, 2005) another central model on academic self-concept is Marsh's internal/external frame of reference model (Harter, 1982; Marsh, 1989; Marsh & Yeung, 2001). According to the latter model, a person uses both internal and external frames of references in the formation of academic self-concept in a specific school subject. Children not only compare their performance to the performance of others but also compare their performance in one area to their performance in other areas. In the external (normative/social comparison) frame of reference, students compare their own performance in a given domain (e.g., mathematics) with their perceptions of other students' performance in the same domain. In the internal (ipsative-like) frame of reference students compare their performance in a particular domain (e.g., mathematics) with their performance in other school subjects (e.g., literacy). Domain-specific academic self-concepts are formed in these simultaneous comparison processes. Thus, if a student is poor in mathematics compared to other students in his/her class (external comparison) yet, compared to his/her performance in other school subjects (e.g., literacy, history), is doing better in mathematics than in other school subjects (internal comparison), his/her mathematics self-concept can nevertheless be high.

Another line of research bordering on Marsh's model is research on the different ways people perceive their competencies and their potential to improve their competencies (Kasanen, Rätty, & Eklund, 2009; Kärkkäinen, 2011; Rätty, Kasanen, Kiiskinen, Nykky, & Atjonen, 2004). This line of research has separated intrapersonal perceptions from interpersonal perceptions by defining interpersonal perceptions as children's "perceptions of their improvement potential in comparison with other children's achievement", and intrapersonal perceptions as "the children's perceptions of their potential to improve their competences in relation to their current ones" (Kärkkäinen, 2011, p. 28; see also Kasanen et al., 2009; Rätty et al., 2004). These different perceptions have further been shown empirically to form distinct domains (Kärkkäinen, Rätty, & Kasanen, 2008).

1.3 The development of self-concept of ability

Previous research on the development of self-concept of ability has focused on the associations of self-concept of ability with academic performance or other academic outcomes (for a review, see Valentine et al., 2004; Meece et al., 1990). In the skill development model (Calsyn & Kenny, 1977; Chapman & Tunmer, 1997), academic achievement is a primary determinant of the development of self-concept of ability, with low achievement and learning disabilities leading to negative self-perceptions and high achievement leading to positive self-perceptions (Mujis, 1997). The self-enhancement model, in turn, suggests that it is self-concept of ability that predicts subsequent academic achievement rather

than vice versa (Calsyn & Kenny, 1977; Chapman & Tunmer, 1997). According to this view, individuals' self-concept has consequences for their skill development because it influences their motivation and effort in the learning context (Aunola, Leskinen, Onatsu-Arvilommi, & Nurmi, 2002). Marsh's reciprocal effects model (e.g., Marsh, Trautwein, Lüdtke, Köller, & Baumert, 2005) combines the ideas of these two models suggesting that the relationship between academic self-concept and achievement is reciprocal: academic self-concept has a significant effect on academic achievement and academic achievement has an effect on self-concept. Although empirical research has provided support for this reciprocal model (Marsh et al., 2005; Valentine et al., 2004), there is also some evidence to show that the association might vary depending on the developmental period under scrutiny. For example, studies focusing on the early school years seem, in particular, to support the skill-development model (Aunola et al., 2002; Chapman & Tunmer, 1997; Helmke & van Aken, 1995).

1.3.1 First grade as a developmental stage

The first grades of primary school seem to be an important developmental period for the development of self-concept of ability. Besides the development of cognitive reasoning skills during this period, a whole new social context becomes a part of the child's everyday life: the child starts to receive everyday feedback from teachers, children form new friendships, and classmates become points of comparison. The beginning of first grade means an increase in academic demands, a shift towards more structure, and heightened focus on autonomy (Alexander, Entwisle, & Dauber, 1993; Entwisle & Alexander, 1993). Entwisle and Alexander (1989) have described this period as a "critical period" because the child's external and internal worlds are simultaneously undergoing significant change. These changes include new social situations that children encounter in the classroom and in primary schools in general, such as when an unrelated adult (the teacher) becomes part of the child's everyday life, an experience shared by all children of the same age. Children also encounter new challenges at school. These social and academic changes in children's lives are accompanied by rapid cognitive development. It has been shown that children's memory span, general learning capacity, and speed of cognitive processing all develop rapidly over ages 5–8 (Varnhagen, Morrison, & Everall, 1994).

Previous studies have shown that children often have very positive and even unrealistic perceptions of their abilities during the first years of primary school (Aunola, et al., 2002; Wigfield & Eccles, 2000). As they grow older, children's perceptions of their abilities become more realistic and more negative (Dweck, 2002; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002). Children's perceptions of the malleability of their abilities have also been shown to become more negative during the school years (Kasanen et al., 2009). One suggested explanation for this change is that students adopt the normative assessment practices of schools. These practices convey the idea that abilities are stable characteristics rather than susceptible to change, for example through effort (Kasanen et al., 2009). Children's self-concepts of ability have also been found to

be highly unstable during their first months of primary school, but to have become relatively stable by the end of the first grade (Aunola et al., 2002). It has been shown that children start to view their abilities more realistically at the age of 7–8 (Dweck, 2002). According to Dweck (2002), one reason for this change could be that, at around this age, children become more responsive to performance feedback. Children's cognitive development takes several further steps at the age of 7–8, which is the time when they start school in Finland. For example, their memory skills and speed of cognitive processing develop (Varnhagen, Morrison, & Everall, 1994).

1.3.2 Lower secondary school as a developmental stage

It has been suggested that the transition to lower secondary school is also an important developmental period for self-concept of ability development because it means changes in adolescents' everyday social relationships and in the types of feedback they are given in school (see Wigfield et al., 2006). During such school transitions, students are particularly susceptible to external feedback, such as parental beliefs, regarding their competencies (Ruble, 1994). In the late 1980s, Eccles and Midgley (1989) proposed the stage – environment fit model, which focuses on the impact of school transitions on adolescent development (see Eccles et al., 1993). The model states that a poor fit between changes on the individual (stage) and contextual (environment) levels may lead to a lowering of ability beliefs during a school transition. For example, students entering secondary school face contextual changes such as a stronger emphasis on teacher authority (Harter, Whitesell, & Kowalski, 1992; Midgley, Feldlaufer, & Eccles, 1989), less autonomy (Harter et al., 1992), more social comparisons via feedback structures (Harter et al., 1992), and stricter grading practices (Eccles & Midgley, 1989), than in elementary school. At the same time, adolescents are going through individual developmental changes related to puberty, such as an intensified need for autonomy, peer orientation, and identity formation (Wigfield & Wagner, 2005). It is argued that the lowering of ability beliefs during the transition from primary to lower secondary school can be explained by a poor fit between these individual (stage) and contextual (environment) changes (Eccles et al., 1993). Research has demonstrated the prevalence of such shifts in self-concept among adolescents: competence-related self-assessments have been shown to be less stable during the transition to lower secondary school compared to the time before and after the transition (Cole et al., 2001; Hoge, Smit, & Hanson, 1990).

1.4 Parental beliefs as predictors of self-concept of ability

It has been conceptualized that self-concepts of ability are formed in interaction with other people, and are influenced by evaluations by significant others and by reinforcements of one's behavior (Bong & Skaalvik, 2003; Eccles et al. 1983;

Gniewosz, Eccles, & Noack, 2014; Shavelson et al., 1976). According to Eccles et al.'s expectancy-value model, parental beliefs play an important role in students' ability beliefs (Eccles et al., 1993). Empirical research has supported this assumption about the important role parents have in the development of their children's subject-specific self-concept of ability (Eccles Parsons, Adler, & Kaczala, 1982; Frome & Eccles, 1998; Gniewosz et al., 2012; Jacobs, 1991; Lau & Pun, 1999; McGrath & Repetti, 2000; Phillips, 1987). For example, previous studies have shown that parents' beliefs in their child's success in the literacy domain are positively related to sixth-grade students' self-concept of literacy ability (Frome & Eccles, 1998). Parental beliefs in the domain of mathematics have also been found to be positively related to students' self-concept of ability among sixth- and seventh-grade students (Gniewosz et al., 2012). Parents' perceptions of their children's abilities have also been found to mediate the associations between school grades and students' academic self-concept in both mathematics and native language among fifth- to seventh-graders (Gniewosz et al., 2014).

The expectancy-value model suggests several mechanisms that could explain the links between parental beliefs and students' achievement-related perceptions (Eccles et al., 1983; 1993; Simpkins, Fredricks, & Eccles, 2012). First, parents can communicate their beliefs to their children through different kinds of feedback: by giving them direct encouragement or by praising them when they do well in school (Gniewosz et al., 2014). Second, parents may indirectly communicate their beliefs through the way they behave with their children, for example helping children with their schoolwork. The earlier literature on the role of parents' beliefs on children's self-concept of ability has, however, some limitations. First, only a few studies have examined the role of both mothers and fathers (for an exception, see Frome & Eccles, 1998; Gniewosz & Noack 2012). Second, although many studies have examined the antecedents of self-concept of ability, few attempts have been made to examine these among the youngest students (Wigfield et al., 1997). Third, earlier studies on the role of parental beliefs have mainly been carried out in the USA (with exceptions; see, e.g. , Gniewosz & Noack, 2012 for a study conducted in Germany), and thus less is known about the role of parental beliefs in self-concept development in diverse cultural settings.

1.5 Teachers' beliefs as predictors of self-concept of ability

Besides parental beliefs, teachers' child-related competence beliefs and expectations have also been shown to influence students' self-perceptions. Rosenthal and Jacobson found in their classic study (1968) that teachers' expectations of students' behavior served as a self-fulfilling prophecy: the higher the teachers' expectations, the higher the level of students' school achievement later on. This result might be due to teachers' expectations impacting on students' self-perceptions which, in turn, impact on their achievement. More recent research has shown that teachers' expectations and beliefs do in fact play a role in stu-

dents' self-perceptions. For example, teachers' positive beliefs about students' competencies have been shown to predict positive changes in sixth-grade students' mathematics self-perceptions (Madon et al., 2001). Similarly, teachers' expectations concerning their students' reading achievement were found to be positively associated with students' own expectations and performance in reading among fourth- to sixth-grade students (Brattesani, Weinstein, & Marshall, 1984). Moreover, teacher evaluations have been shown to play an even larger role in third- to fourth-graders' general self-concept (i.e., children's perceptions of their general school-related ability) than parents' perceptions (Spinath & Spinath, 2005). Although it has been found that teachers' evaluations correlate highly with objective measures of school performance (e.g., Hoge & Coladarci, 1989), and can thus be considered rather accurate, teachers do not necessarily accurately perceive their students' underlying cognitive capacities. It has been shown, for example, that teachers are not good at detecting underachievers, that is, students who have high abilities but show poor performance in school (e.g., Rost & Hanses, 1997). Like parental beliefs, teachers' beliefs can be communicated to children through different kinds of feedback, such as praise or feedback about how well a task is being accomplished (Hattie & Timperley, 2007). One of the most unambiguous types of ability-related feedback teachers can give students is grades (Spinath & Spinath, 2005).

While the role of parents' and teachers' beliefs in students' self-concept development have been examined, only a few studies have focused simultaneously on both of these (for an exception, see Spinath & Spinath, 2005). Spinath and Spinath (2005) found, among German elementary school students, over the course of grades 1–4, that teachers' evaluations became more important for students' general ability perceptions while the importance of parental perceptions decreased. Previous studies have also shown that individuals evaluate themselves in different ways in different relationships (Harter, Waters, & Whitesell, 1998). Thus, it is important to investigate the role of both parents and teachers in students' self-concept of ability.

1.6 The role of performance level in the associations between self-concept of ability and parental and teachers' beliefs

Researchers interested in the relation between parental and teacher beliefs and children's self-concept of ability have tended to assume a positive association between a high level of teacher (e.g., Tiedemann, 2000) and parental beliefs (Eccles Parsons et al., 1982; Frome & Eccles, 1998) and a child's own ability-related beliefs. There are grounds for thinking, however, that the associations between teachers' and parents' beliefs and a child's self-concepts of ability may vary depending on the child's performance level. According to Bohlmann and Weinstein (2013), for example, children's cognitive reasoning skills (which highly correlate with their performance; Dermitzaki & Efklides, 2000) affect the way

they perceive, interpret, and attribute meaning to teachers' actions. They argued that "interpreting performance feedback may depend on the ability to coordinate multiple forms of feedback and logically analyze the meaning of positive versus negative messages in application to the self" (p. 290). Following this line of reasoning, it might be assumed that high-performing children are more likely than low-performing children to be influenced by adults' beliefs, as, owing to their cognitive abilities, they are capable of making more accurate interpretations of adults' performance feedback.

Another theoretical proposal that provides some grounds for thinking that low- and high-performing students' self-concept of abilities may be differently associated with adults' beliefs is the self-verification theory (Swann, 2011). The theory proposes that people prefer others to see them in the same way as they see themselves, even when a person's perception of him- or herself is negative. This has been termed self-verification, which, it is posited, people seek because it makes the world seem more coherent and predictable. On this line of reasoning it can be assumed that high-performing students are more likely to benefit from positive teacher and parental beliefs than low-performing students because these positive beliefs better fit their perceptions of themselves. Low-performing students, in turn, might have strong negative perceptions of themselves, which positive beliefs expressed by teachers' and parents' contradict; this lack of fit between self-perceptions and external evaluations may explain why teachers' and parents' positive beliefs do not generally have a positive impact on low-performing students' self-concept of ability.

1.7 The role of gender in the associations between self-concept of ability and parental and teachers' beliefs

Previous studies have found that child gender influences parental beliefs. For example, parents seem to hold the view that boys are better in mathematics than girls (Eccles & Jacobs, 1987; Eccles Parsons et al., 1982; Gunderson, Ramirez, Levine, & Beilock, 2012; Rätty, Vänskä, Kasanen, & Kärkkäinen, 2002; Tiedemann, 2000), independently of children's actual performance in the subject (Eccles et al., 1993; Eccles Parsons et al., 1982). This belief has been found to impact girls' self-perceptions in mathematics (Jacobs, 1991). Moreover, parents typically think that girls do better in literacy than boys (Gniewosz et al., 2014; Rätty et al., 2002; Wigfield & Eccles, 1992). Teachers also seem to have a gender bias in their beliefs about students' abilities, at least in mathematics (for a review, see Li, 1999; Gunderson et al., 2012). It has been found that teachers are prone to stereotype mathematics as a male domain (Li, 1999).

Although some studies have focused on these mean-level differences in parental beliefs regarding boys and girls, less is known about whether gender influences the associations between parental beliefs and their children's self-concept of ability. It is important to study the possible influence of child gender

on these associations as socialization and cognitive theories posit that the associations may not be the same for boys and girls (Simpkins et al., 2012). Both sets of theories posit that adolescents most likely act in the same way as people who bear the most resemblance to themselves (Maccoby, 1998). Following this idea, mothers may have a stronger impact on their daughters than on their sons, and fathers may have a stronger impact on their sons than on their daughters. Simpkins et al. (2012) pointed out that it is also important to test the moderating effect of gender since it may have important implications for interventions. If parental beliefs influence boys' and girls' self-concept of ability differently, this should be taken into account when designing interventions to support girls and boys.

1.8 Aims of the research

Since students' self-concepts of abilities are an important determinant of their academic outcomes (Bouchey & Harter, 2005; Musu-Gillette et al., 2015), it is important to study how these perceptions develop and what factors are relevant for the formation of self-concept of ability. In this research, the primary aim was to investigate the role of parents' and teachers' beliefs in the development of students' self-concept of ability both at the beginning of the school career, i.e., during the first grade, during the transition to lower secondary school (in grades 6 and 7), and after the transition to lower secondary school, i.e., in grades 7 and 9. The possible influence of students' gender and level of performance on the associations between parental/teacher beliefs and self-concept of ability was also investigated. The specific main research questions were:

1. To what extent do parents' and teachers' child-related competence beliefs predict the development of students' self-concept of literacy and mathematics ability during these developmental periods?
2. Are there differences in the possible associations between parental/teacher beliefs and students' self-concept of abilities depending on students' gender and level of performance?

2 METHOD

The data for Study I were drawn from the LIGHT study (LIGHT study, 2016) and collected during the years 2006-2009; the data for Study II were drawn from the Jyväskylä Entrance into Primary School (JEPS) study (JEPS study, 2016) and collected during the years 1999-2009; and the data for Study III were drawn from the STAIRWAY study (STAIRWAY study, 2016) and collected in the years 2014-2016.

Below, each of these datasets is briefly presented. A summary of the methods employed is presented in Table 1 (p. 27). More detailed information on the studies can be found in the original articles.

2.1 Study I: The LIGHT study

The participants of Study I were 152 Finnish first graders (79 girls, 73 boys; age range from 6 years 9 months to 8 years 8 months, $M = 7.5$ years) and their teachers and parents. The children were interviewed in the fall (October; Time 1) and spring (April; Time 2) semesters of their first-grade year on their self-concept of ability in mathematics and literacy. The children's performance in literacy and mathematics was tested in the fall semester. The children's mothers, fathers, and teachers answered a questionnaire on their beliefs and expectations regarding the target child's abilities and provided some background information, also in the fall semester.

Children's self-concept of mathematics and literacy ability was measured using a questionnaire modified from the scale developed by Eccles and her colleagues (Wigfield et al., 1997). The questionnaire consisted of three items measuring mathematics-related self-concept and three items measuring literacy-related self-concept. Answers were given on a 5-point Likert-scale (1 = "not very good", 5 = "very good"). The Cronbach's alpha reliabilities were .55 and .66 for mathematics-related self-concept and .70 and .53 for literacy-related self-concept at Time 1 and Time 2, respectively.

Mothers, fathers, and teachers were asked about their beliefs regarding the target child's success at school via questionnaires (Aunola et al., 2002; Aunola, Nurmi, Lerkkanen, & Rasku-Puttonen, 2003). The scale consisted of a set of items modified from the questionnaires used by Eccles Parsons et al. (1982). Two of these items measured beliefs about the children's literacy skills and two items measured beliefs about the children's mathematics skills. Each parent, separately, and the child's teachers answered the questions on a 5-point Likert-scale (1 = "poorly", 5 = "very well"). Cronbach's alphas for their beliefs in mathematics and literacy were: for mothers .74 and .75, respectively, for fathers .72 and .76, and for teachers .88 and .88.

Children's mathematics performance was measured by two tests. The children's knowledge of cardinal numbers and basic mathematical concepts (e.g., equal to, more than, less than) was measured by 11 tasks that became progressively more difficult (Ikäheimo, 1996). In the basic arithmetic test (Aunola, 2005), the children's skill level in basic arithmetic is assessed using a set of visually presented addition and subtraction tasks. The test comprises a total of 20 tasks. One point is given for each correct answer. A total score for performance in mathematics in the fall semester (Time 1) of the first grade was arrived at by calculating a sum score based on the number of correctly completed tasks on cardinal numbers and basic arithmetic.

The children's literacy performance was assessed by two subtests. In the reading words test, children are asked to read aloud a set of 20 words of progressive difficulty (Normaalikoulu, 1985). One point is given for each correctly read word, yielding a maximum score of 22. This subtest is known to be sensitive to the early stages of reading (see Leppänen, Niemi, Aunola, & Nurmi, 2004). In the oral reading fluency test, the children's task is to read aloud, to their best ability, a short story in an individual test situation (Onatsu, Nurmi, & Aunola, 1999). The score for oral reading fluency is computed by dividing the number of words read correctly by the time (in seconds) it took for the child to read the whole story. This subtest is known to be sensitive to more advanced reading skills (see Leppänen et al., 2004). A total score for literacy performance in the fall semester of the first grade (Time 1) was arrived at by calculating a mean score from the standardized scores (z-scores) for reading words and oral reading fluency.

2.2 Study II: The JEPS study

The participants of Study II were 231 Finnish students in grade 7 and 221 in grade 9 (in grade 7: 114 girls and 117 boys; in grade 9: 107 girls and 114 boys) and their mothers (n = 221) and fathers (n = 191). The adolescents filled in questionnaires on their self-concept of ability in the spring of the 7th grade and again in the spring of the 9th grade. Performance in mathematics and literacy was assessed by tests in the spring term of the 7th grade. Mothers and fathers were asked to fill in mailed questionnaires regarding their beliefs about their

child's performance in mathematics and literacy in the spring of grade 7. The response rates were 96% for mothers and 83% for fathers.

Students' self-concept of ability in mathematics and literacy was measured with a questionnaire based on the ideas presented by Eccles and Wigfield (1995). Students were asked to answer three questions for mathematics and three questions for literacy on a 5-point Likert-scale (1 = "not very good", 5 = "very good"). Self-concepts of ability in mathematics and literacy were scored separately by calculating the mean of the three items in each case. The Cronbach's alpha reliabilities for self-concept in mathematics in grade 7 and grade 9 were .87 and .89, respectively, and for self-concept in literacy .81 and .81.

The adolescents' performance in mathematics was assessed with the group-administered KTLT test (Räsänen & Leino, 2005) which is a standardized mathematics test for grades 7-9 (13-16 years of age). The test consists of 40 mathematical tasks (basic calculation and equation tasks, word problems, geometry tasks, measurement tasks), to be done individually. One point is given for each correct answer.

The adolescents' performance in literacy was measured by three subtests taken from the Dyslexia Screening Test for Youth and Adults (Holopainen, Kairaluoma, Nevala, Ahonen, & Aro, 2004). In the first task, the spelling error finding test, the participants are asked to mark with a vertical line on 100 words typed on a sheet of paper as many spelling errors (an extra, missing, or wrong letter in a word) as they could identify in 3.5 minutes. The score is the number of correctly detected errors. In the second test, the word chain test, the participants are asked to separate understandable words in a word chain by drawing a line between the words. A total of 100 words are presented in chains of four words with no spaces between them. The adolescents are allowed 3.5 minutes to find the boundaries between the words in each chain and to mark these with a vertical line. The test is scored as the number of correctly found words. In the third test, focusing on reading comprehension, the participants are asked to read a four-page long story (*The Hounds of the Village*, written by Veikko Huovinen, a Finnish novelist), in which 52 words had been changed so that they do not fit in with the story (i.e., they are in contradiction with the meaning of the sentence, paragraph or larger textual context). The participants are asked to underline all the inappropriate words they could find. One point is given for each correctly underlined word. The time limit for the subtest is 45 minutes. The sum score of the standardized three subtest scores was taken as the measure of literacy performance.

Mothers' and fathers' beliefs were measured at the end of the 7th grade with 4 items, using a 4-point Likert-scale (1 = "not very good", 4 = "very good"). The scale consisted of a set of items modified from the questionnaires used by Eccles Parsons et al. (1982). Two of these items measured parental beliefs about the children's reading skills and two items measured beliefs about the children's mathematics skills. The Cronbach's alpha reliabilities of the scale were .92 (literacy) and .93 (mathematics) among mothers and .92 (literacy) and .93 (mathematics) among fathers.

2.3 Study III: The STAIRWAY study

The participants of Study III were 841 sixth-grade students (456 girls, 385 boys; mean age = 12.3 years, SD = 0.3) and their 630 mothers (mothers' response rate = 75%; mean age = 42 years, SD = 5.5). The participating students filled in questionnaires in the fall and spring semesters of grades 6 and 7. Mothers were mailed a questionnaire either on paper by regular mail or as a link to an electronic questionnaire containing questions about their beliefs regarding their children's abilities in the fall semester of grade 6.

Adolescents' self-concept of ability in mathematics and literacy was assessed at four time points (T1 = autumn grade 6, T2 = spring grade 6, T3 = autumn grade 7, T4 = spring grade 7) by using questions adapted from Eccles and Wigfield (1995) and Spinath and Steinmayr (2008) on a 5-point Likert-scale 1 = "very bad/very big difficulties", 5 = "very good/no difficulties". The Cronbach's alpha reliabilities for the self-concept of ability in mathematics scale were .85 (T1), .86 (T2), .85 (T3) and .86 (T4) and for the self-concept of ability in literacy .75 (T1), .73 (T2), .76 (T3) and .77 (T4).

Mothers' beliefs about their child's school success (questions modified from previous studies; Aunola, Nurmi, Niemi, Lerkkanen, & Rasku-Puttonen, 2002; Eccles Parsons et al., 1982; Frome & Eccles, 1998;) were assessed with two items on a 5-point Likert scale (1 = poorly, 5 = very well) in the fall semester of grade 6. The Cronbach's alpha reliabilities for mothers' beliefs regarding their children's success were .91 in mathematics and .92 in literacy.

Mathematics performance was measured with the 3-minutes Basic Arithmetic Test (Aunola & Räsänen, 2007) designed to assess fluency in arithmetic skills. In this group administered test, the participant is required to complete as many arithmetic operations as possible within a three-minute time limit. The test consists of 11 additions, 11 subtractions and four tasks including both additions and subtractions or multiplications or divisions. The test-retest reliability for this task has been 0.86 (Räsänen, Salminen, Wilson, Aunio, & Dehaene, 2009). The score is the total number of correct answers, with a maximum of 28.

Literacy performance was assessed with three subtests. Two tests were drawn from Dyslexia Screening Test for Youth and Adults (Holopainen et al., 2004), the spelling error finding test and the word chain test, which were the same as described in the JEPS study except for the time limit for the word chain test which was 1.5 minutes in the STAIRWAY study and 3.5 minutes in the JEPS study. The third reading test was an adapted form of Salzburg's Reading and Spelling Test (Landerl, Wimmer, & Moser, 1997) in which students are asked to read silently and evaluate as true or false as many as possible of the 36 sentences presented. The time allowed for the test is 1.5 minutes. Two different versions of the test were distributed to the students to reduce the possibility of copying the correct answers from a classmate to a minimum. A sum score of these reading tests was created by calculating the mean of the standardized test scores. The Cronbach's alpha reliability was .87.

TABLE 1 Summary of the participants, measurements and methods used in Studies I, II and III

Study	Data	Measurements	Procedure	Analyses
Study I	The Light study 152 students (79 girls, 73 boys)	- Self-concept of ability in literacy and math - Mothers', fathers' and teachers' beliefs - Children's math performance - Children's reading performance	Longitudinal (1st grade)	Hierarchical regression analysis with SPSS
Study II	The JEPS study 231 students in grade 7 (114 girls and 117 boys), 221 students in grade 9 (107 girls and 114 boys)	- Self-concept of ability in literacy and math - Mothers' and fathers' beliefs - Adolescents' math performance - Adolescents' literacy performance	Longitudinal (7th and 9th grade)	Hierarchical regression analysis with SPSS
Study III	The STAIRWAY study 841 students (456 girls and 385 boys)	- Self-concept of ability in literacy and math - Mothers' beliefs - Adolescents' math performance - Adolescents' literacy performance	Longitudinal (6th and 7th grade)	Growth curve modeling with Mplus

3 SUMMARY OF THE RESULTS

3.1 The role of mothers' and fathers' beliefs in students' self-concept of literacy ability

A summary of the results of all three studies is presented in Table 2 (p. 31). The results of Studies I–II showed that mothers' and fathers' beliefs did not play a role in the development of students' self-concept of literacy ability among the Finnish students. Study I showed that, although mothers' and fathers' beliefs correlated with children's self-concept of mathematics and literacy abilities at the beginning of the first grade, after controlling for the previous level of self-concept and literacy performance, mothers' and fathers' beliefs did not predict the first-grade students' self-concept of literacy ability at the end of the first grade. Moreover, no differences were found in the associations by child gender or level of performance.

The results of Study II showed a similar pattern among the Finnish lower secondary school students: after controlling for the previous level of self-concept and literacy performance, neither mothers' nor fathers' beliefs predicted adolescents' self-concept of literacy ability. Similarly, no performance-level or gender interaction effects were observed.

The Study III results showed that both the level of literacy performance and maternal beliefs predicted the level of self-concept of literacy ability: the higher the level of literacy performance and the higher the maternal beliefs, the higher the students' level of self-concept of literacy ability. Because no statistically significant individual variation was found in the developmental trend of self-concept of literacy ability, no effect of maternal beliefs on the development of self-concept of literacy ability was found either. No performance-level or gender interaction effects were observed.

3.2 The role of mothers' and fathers' beliefs in students' self-concept of mathematics ability

Study I showed that, after controlling for the previous level of self-concept and mathematics performance, neither mothers' nor fathers' beliefs predicted the first-grade students' subsequent self-concept of mathematics ability. Similarly, no differences were found in the associations by child gender or level of performance either.

Study II showed that, after controlling for the previous levels of self-concept of mathematics ability and mathematics performance, mothers' and fathers' beliefs about their child's abilities predicted the children's subsequent self-concept of mathematics ability at the end of grade 9: the higher the beliefs parents had about their child's mathematics ability in grade 7, the higher the children's self-concept of mathematics ability was in grade 9. Furthermore, in the domain of mathematics the connections between the adolescents' self-concept of ability and their mothers' beliefs was found to be different depending on the adolescent's level of performance: the impact of their mothers' beliefs on their subsequent self-concept of mathematics ability was stronger among the high- than low-performing adolescents. Gender did not play a role in the above associations between parental beliefs and self-concept of ability, and level of performance had no impact on the associations between fathers' beliefs and students' self-concept of mathematics ability.

Study III showed that both adolescents' performance in mathematics and their mothers' beliefs were associated with the level of self-concept of mathematics ability: the higher the mathematics performance and the higher the maternal beliefs, the higher the self-concept of mathematics ability at the beginning of the sixth grade. This result was true independently of students' performance level or gender. The results showed further that the linear trend of self-concept of mathematics ability was predicted not only by level of mathematics performance but also by the interaction term mathematics performance \times mother's belief. Although self-concept of mathematics ability decreased on average among all the adolescents across time, maternal high beliefs buffered against this decrease more among high-performing adolescents than low-performing adolescents.

3.3 The role of teachers' beliefs in students' self-concept of literacy ability

The role of teachers' beliefs in children's self-concept of ability was examined in Study I, in which the participants were Finnish first-grade students. The results showed that teachers' beliefs marginally ($p < .10$) predicted children's subsequent literacy-related self-concept: after controlling for the previous level of

self-concept and literacy performance, the higher the teachers' beliefs concerning a child's literacy ability at the beginning of the first grade, the higher the self-concept of literacy ability the child reported at the end of the first grade. The results showed further that the association between teachers' beliefs and children's subsequent self-concept of ability differed depending on the level of the child's performance. Among the children with high literacy performance, teachers' beliefs about a child's success in literacy at Time 1 positively predicted the child's literacy self-concept at Time 2: after controlling for the previous level of self-concept of ability, the higher the teachers' beliefs at the beginning of the first grade, the higher the child's self-concept of ability at the end of the first grade. In turn, among the children with low initial literacy performance teachers' beliefs in a child's success in literacy did not show this positive impact.

3.4 The role of teachers' beliefs in students' self-concept of mathematics ability

The results of Study I showed that, although teachers' beliefs had no main effect on children's self-concept of mathematics ability, the interaction term mathematics performance \times teacher belief was statistically significant, suggesting that the association between teachers' beliefs and children's self-concept of mathematics ability differed depending on the level of the child's mathematics performance. The results showed further that among the children with high mathematics performance, teachers' beliefs about these children's success in mathematics (Time 1) positively predicted the development of the children's self-concept of mathematics ability: among the high-performing children, after controlling for the previous level of self-concept of ability and mathematics performance, the higher the teachers' beliefs at the beginning of the first grade, the higher the children's subsequent self-concept of mathematics ability at the end of the first grade. Among the children with lower initial mathematics performance, teachers' beliefs in their success in mathematics did not have this positive impact.

TABLE 2 Summary of the results in Studies I, II and III

	Self-concept of literacy ability			Self-concept of mathematics ability		
	Mothers	Fathers	Teachers	Mothers	Fathers	Teachers
Study I (Finnish 1st Graders)	- no effects	- no effects	- positive effect among high- performing students	- no effects	-no effects	- positive effect among high- performing students
Study II (Finnish 7th and 9th Graders)	- no effects	-no effects		- positive effect; effect stronger among high- than low- performing students	- positive effect	
Study III (Finnish 6th and 7th Graders)	-positive effect on the level of self-concept			- positive effect on the level of self-concept - positive effect on the linear trend of self-concept particularly among high-performing students		

4 DISCUSSION

The aim of this research was to investigate the role of parents' and teachers' beliefs about children's abilities in students' self-concept of ability in the domains of mathematics and literacy. It has been demonstrated that parents' (e.g., Eccles Parsons et al., 1982; Frome & Eccles, 1998) and teachers' (Madon et al., 2001) perceptions concerning children are a crucial determinant of children's self-beliefs. However, an important limitation of the previous research is that it has focused predominantly on the role of mothers to the relative neglect of the role of fathers. The previous research on the role of parental and teacher beliefs in children's self-concept has also largely been confined to children older than first-graders (for an exception, see Spinath & Spinath, 2005), despite suggestions that the first grade is an important period for the development of self-concept of ability (Aunola et al., 2002). Finally, most of the previous research on this issue has been conducted in the USA, Germany or Australia while Finnish studies are scarce. In two of the present three studies, the role of both mothers and fathers in Finnish students' self-concept development was examined. Moreover, the focus was on three different important developmental stages: first grade, the transition to lower secondary school and lower secondary school. This research also contributes to the literature by investigating whether, and if so to what extent, the associations between parental and teacher beliefs and students' self-concept of ability differ according to students' level of performance and gender. Moderating effects of these kinds on the associations between parental and teacher beliefs and students' self-concept of ability have rarely been considered, although there are theoretical grounds for thinking that differences between girls and boys and between low- and high-performing children may exist in these associations.

4.1 The role of parents' beliefs in the development of students' self-concept of ability

Study I found that parents' beliefs did not predict the development of their children's self-concept of mathematics and literacy ability among Finnish first

graders. Study II, however, demonstrated that mothers' and fathers' beliefs predicted the development of students' self-concept of mathematics ability among Finnish lower secondary school students: the higher the parental beliefs at the beginning of lower secondary school, the higher the adolescent's self-concept in mathematics at the end of lower secondary school. Also, in Study III, mothers' beliefs were positively associated with the level of self-concept of mathematics and literacy ability: the higher the maternal beliefs, the higher the self-concept of mathematics and literacy ability at the beginning of the sixth grade. Study III found that the linear trend in self-concept of mathematics ability was predicted by mothers' beliefs and that students' level of performance influenced this prediction. Self-concept of mathematics ability decreased on average among all adolescents across time, but high mothers' beliefs buffered against this decrease, particularly among high-performing adolescents.

The results of Studies II and III are consistent with previous studies that have found associations between parental beliefs and students' self-concept of abilities (e.g., Frome & Eccles, 1998; Gniewosz et al., 2012). The Study I finding that parental beliefs did not predict the development of Finnish first-grade students' self-concept of ability differed from the findings of Studies II and III. This discrepancy might be explained by the crucial importance of the first school years for the development of both children's self-concept of ability and parental belief systems concerning their children. For this reason, the role of teachers in the development of children's self-concept of ability is likely to carry more weight during the first grade than that of parents. Overall, the present finding that parental beliefs have no effect on the development of first-graders' self-concept is in line with Spinath and Spinath (2005), who, in their study of German children in grades 1-4, found that while children's ability perceptions and parental perceptions of their children's abilities were not associated with each other during the first grade, they showed a clear association later in elementary school.

4.2 The role of teachers' beliefs in the development of students' self-concept of ability

Study I examined the role of teachers' beliefs in children's self-concept of ability in literacy and mathematics. The results showed that while teachers' beliefs predicted children's self-concept of ability at the end of the first school year in literacy and mathematics, this prediction was dependent on the level of the children's performance. Among children whose performance level was initially high, teachers' beliefs positively predicted self-concept of ability: the higher the teachers' beliefs, the higher the children's subsequent self-concept of ability in literacy and mathematics. Among children with a low performance level this positive prediction was not found. The finding of a positive relationship between teachers' beliefs and children's self-concept of ability is in line with the

findings of several previous studies (Blumenfeld, Pintrich, Meece, & Wessels, 1982; Brattesani et al., 1984; Madon et al., 2001; Spinath & Spinath, 2005). However, the present results contribute to the literature by showing that the positive association between teachers' beliefs and students' self-concept of ability was present only among high-performing students.

The result showing no relationship between teachers' beliefs and students' self-concept of ability among low-performing children has several possible explanations. It might be that teachers communicate their beliefs, even where they are equally positive, differently to children with different performance levels. If so, this means that low- and high-performing students perceive these messages in different ways. Previous research has shown that teachers treat low- and high-performers differently. For example, Blöte (1995) found that both students and teachers shared the view that low-performers receive more help and support from their teachers and are put under less pressure than high-performers. It has also been shown that low-performing students receive more negative feedback from teachers than high-performing students (Weinstein, Marshall, Brattesani, & Middlestadt, 1982). Wigfield and Harold (1992) found that teachers' perceptions of children and children's self-perceptions of their own achievement were only modestly related. They proposed that the reason for this modest relationship could be that teachers' beliefs form only one source of information for children; namely, children also receive information, for example, from their own previous performance, the performance of peers, and messages from their parents. Thus, it is possible that low-performing children do not benefit from positive teacher beliefs because other feedback pertaining to their skills (e.g., performance outcomes, peer influences and comparisons) might have a stronger effect on their self-concept than teachers' beliefs.

It is also possible that students understand teacher's cues about their beliefs differently depending on their level of performance. Students with a poor level of performance might interpret positive teacher feedback as special attention given by the teacher because the student is doing badly at school. In contrast, students with a high level of performance may interpret positive teacher feedback as an indication of their high achievement. False beliefs by teachers may explain why teachers' positive beliefs had no impact on students' self-concept of ability among low-performing children. It is also possible that teachers' beliefs and high-performing students' self-concepts coincide because teacher-student interaction might be more constructive and positive in the case of high-performing students.

The present study is one of the few to yield information about the possible role of teachers in the case of very young students. Most previous studies have been conducted with students older than first graders. However, the age of the present students, i.e., 7-8 years, can be assumed to be an important developmental period and thus a fruitful one in which to study the role of teachers in children's self-perceptions, as it is during this period that children become more responsive overall to performance feedback (Dweck, 2002). The results of Study I are in line with this observation on children's development by showing that

teacher beliefs were related to the development of self-concept in 7- and 8-year-olds, at least among those who are performing relatively well in school.

4.3 The moderating role of students' performance level

In Studies I, II, and III the level of students' performance moderated the connections between teachers' (Study I) or mothers' (Studies II and III) beliefs and students' self-concept of ability. In Study I, the role of teachers' beliefs in students' self-concept of ability was dependent on students' level of performance in both mathematics and literacy. Among children whose performance level was initially high, teachers' beliefs positively predicted self-concept of mathematics and literacy ability: the higher the teachers' beliefs, the higher the students' subsequent self-concept of ability. Among children with a low performance level this positive prediction was not found.

In Study II, the role of mothers' beliefs about their child's mathematics ability was dependent on the level of the child's performance: mothers' beliefs were positively related to their children's subsequent self-concept of mathematics ability among high-performing children but less so among low-performing children.

In Study III, mothers' beliefs about their children's abilities predicted changes in their children's self-concept of mathematics ability; however, this prediction was moderated by the children's level of performance. Although on average the adolescents' self-concept of mathematics ability decreased over time, mothers' high beliefs buffered against this decrease more among high-performing adolescents than among low-performing adolescents.

Several possible explanations can be offered for the finding that students' performance level had a moderating role on their self-concept of ability in literacy and mathematics. According to Eccles et al.'s expectancy-value model (Eccles et al. 1983), parental beliefs are communicated to their children in a variety of ways. Parents who have high beliefs in their children's ability may, for example, directly encourage their children to do better in school (see, e.g., Gniewosz et al., 2014). In Studies I, II and III, the reason for the difference in the impact of beliefs on self-concept among low- and high-performing students may have to do with the ways parents and teachers communicate their beliefs to these differently performing students. For example, previous studies have found that teachers seem to treat low- and high-performing students differently (Blöte, 1995; Weinstein et al., 1982). However, because the present research did not investigate the mechanisms through which parental and teacher beliefs are communicated to students, future research is needed on such possible differences in communication.

It might also be that, in the case of low-performers, teachers' and mothers' positive beliefs in the success of these children give them misleading messages about their level of performance. However, abilities can be seen not only as stable internal capacities but also as affected by, for example, effort (Dweck, 2002).

Thus, the children in this research who were categorized as low-performers may not lack the potential for doing better, and could realize their potential if they put more effort into their schoolwork. On this line of reasoning, teachers and parents can believe in the possibility for achievement of low-performing students without having a false perception of their abilities. In fact, Rautiainen, Rätty and Kasanen (2016) found in their study that Finnish parents tend to think that intelligence can be increased through effort and practice.

According to the self-verification theory (Swann, 2011), people prefer others to see them in the same way as they see themselves, even if these self-perceptions are negative. Thus, it may be that high-performing students benefit more from positive teacher and parental beliefs than low-performing students because such positive beliefs better fit high-performers' perceptions of themselves. Low-performing students, in turn, might have a strong negative self-concept of ability, which is contradicted by positive beliefs on the part of their teachers and parents. This may explain why teachers' and parents' positive beliefs had only a weak positive impact on low-performing students' self-concept of ability.

Finally, as Bohlmann and Weinstein (2013) argued, children's cognitive abilities influence their perceptions and interpretations of teachers' actions. Accordingly, it might be assumed that high-performing children have better cognitive abilities, which in turn enable them to more accurately perceive and interpret teachers' beliefs from teachers' behaviors. However, it is possible that our data include underachieving students, that is, students who show low performance despite having the potential to do better. Among underachievers of this type, who have better cognitive abilities than their performance would suggest, poor cognitive competence in interpreting social cues cannot be adduced to explain the finding.

4.4 Gender differences

In all three studies, gender was not found to have any effect on the relationship between teachers' and parents' beliefs and the development of children's self-concept of ability. These results are not in line with the socialization and cognitive theories, which posit that adolescents are likely to act in a same way as people who bear the greatest similarity to themselves (Maccoby, 1998). Based on these theories, mothers have a stronger impact on their daughters than on their sons and fathers have a stronger impact on their sons than on their daughters. The results of the present research do not support these ideas. Simpkins et al. (2012) pointed out that it is important to investigate gender effects in the connections between adults' beliefs and students' self-concept of ability so as to know, when planning interventions, whether girls and boys need different kinds of support from their parents and teachers. The findings of this research suggest that the role of parental and teachers' beliefs are similar for both boys and girls.

The result that parental and teachers' beliefs showed similar associations with boys' and girls' self-concept of ability may be explained by cultural factors. Since Finland can be considered an egalitarian culture (Chiu & Klassen, 2009, 2010), it is likely that it will display fewer gender differences overall. In an egalitarian culture, individuals are taught to view, value, and act towards one another as equals based on their common humanity (Chiu & Klassen, 2009, 2010). People learn these practices and values through formal and informal socialization, including through schooling. This could provide one explanation for the absence of a gender effect on the associations between adults' beliefs and self-concept of ability. Thus, it is possible that gender differences in the role of adults' beliefs in the development of children's self-concept of ability are less in evidence in the Finnish than, for example, in the North-American culture, where gender differences have been reported (Eccles & Jacobs, 1987; Gunderson et al., 2012).

Although no gender differences were found in the associations between parents' or teachers' beliefs and students self-concept of ability, gender differences were found in the level of self-concept of ability. In Study II, self-concept of literacy ability was found to be higher among girls than boys across the measurement points, whereas self-concept of mathematics ability was higher among boys than girls. Study III showed that boys had a higher level of self-concept of mathematics ability than girls, whereas girls reported a higher level of self-concept of literacy ability than boys. These results are consistent with the results of previous studies, where girls have shown a poorer self-concept of mathematics ability (Eccles Parsons et al., 1982) but a higher self-concept of native language (English) than boys (Frome & Eccles, 1998).

One possible explanation for the finding that self-concept of literacy ability was higher among girls than boys, whereas self-concept of mathematics ability was higher among boys than girls comes from the stereotype threat model. In the stereotype threat model, the traditional gender stereotype that represents females as being less proficient in mathematics and science than males induces gender differences in mathematics performance: girls perform worse than boys in stereotype-laden situations, for example, mathematical tasks (Steele & Aronson, 1995). Moreover, gender stereotypes about mathematics have a negative impact on females' appraisal of their ability in mathematics, regardless of their actual ability in this area (Wigfield, Battle, Keller, & Eccles, 2002). Thus, despite performing well in mathematics girls may have a more negative mathematics-related self-concept than boys. Similarly, literacy can be regarded as a female domain, and it has been found that parents tend to think that girls are better in literacy than boys (Gniewosz et al., 2014; Rätty et al., 2002). This may explain the findings of Studies II and III showing that self-concept of literacy ability was higher among girls than boys.

4.5 Practical implications

The results of this research suggest that parental and teachers' beliefs play a role in the formation of students' self-concept of ability. It should therefore be emphasized in teacher education that it is important that teachers support children and their developing self-concept, and not only teach them new academic skills. Moreover, it is important that schools inform parents about the crucial role parents can have on the development of their children's self-concept, particularly during lower secondary school. It is also important that teachers are aware of the possibility that feedback they give parents about their children could impact the beliefs parents form about their children's success. Furthermore, this research showed that, among Finnish students, parents seem to have a role in their children's self-concept of mathematics ability. The present research also shows that high- and low-performers may benefit from different kinds of teacher and parental support. This possibility should be taken into account when considering how best to support children with different performance levels in the classroom. It might be that low-performing children would benefit, for example, from more specific feedback rather than feedback on domain-specific skills in general.

4.6 Limitations

Studies I-III have their limitations. First, the studies were conducted in only one educational setting, Finland. It is possible that parental and teachers' beliefs play a different role in students' self-concept of ability in different educational settings and cultures, and hence further cross-cultural research on the topic is needed. Second, although longitudinal procedures were used, it might be that some third factor not controlled for in these studies explains the predictions found. Therefore, conclusions on the possible causality of the results can only be tentative. Third, in this research, self-concept of ability was studied using quantitative methods, i.e., through interviews and questionnaires. Qualitative methods might capture the phenomenon in a different way. Since self-concept includes perceptions of the self, and is multidimensional, students may feel that it is hard to express their perceptions of themselves by answering direct questions. It might be easier for students to express their perceptions through, for example, stories or pictures, which could then be analyzed qualitatively. Such an approach could make for a broader understanding of students' perceptions. Fourth, the number of items measuring each study construct was relatively small and, in part for this reason, the scale reliabilities were not identical in all cases. In future studies, broader measures assessing both self-concept of ability and parental and teachers' beliefs should be used to replicate the results reported here. Fifth, in Study I, the role of teachers' beliefs was examined only among Finnish first graders. Thus, the present research does not offer answers to the

question of whether teachers' beliefs also play a role in the development of Finnish lower secondary school students' self-concept. Sixth, when studying teacher or parent and child interaction it is important to note that this interaction is bidirectional (Nurmi et al., 2013). Different children receive different feedback and support from their parents but they also may evoke different reactions in their teachers and parents. Because the present research did not examine the role of children's self-concepts in their teachers' and parents' beliefs, further research is needed on the possible reciprocity of these effects.

4.7 Future directions

It would be important to investigate to what extent teachers' and parents' beliefs are reflected in the feedback they give children and what kind of feedback would be most beneficial, particularly for low- and high-performing children. Although, the present three studies indicate that that high- and low-performers would be likely to benefit from different kinds of teacher and parental support, further studies are needed to ascertain the mechanism behind the associations reported here. Moreover, it would be important to include both measures that directly elicit parental and teachers' beliefs and measures of students' perceptions of parents' and teachers' beliefs. In this way, it would be possible to study to what extent parents' and teachers' beliefs and students' understanding of these beliefs coincide. Furthermore, this research showed that low-performing students may not benefit from positive parental and teacher beliefs. Low-performing students are at risk for dropping out of school and further education. It would be important to examine how to best to support low-performing students and their developing self-concepts. Haimovitz and Dweck (2016) found recently that children's perceptions about their parents' attitudes towards their children's failure predicted children's ideas about how malleable their own abilities are. It was not parents' ideas about children's intelligence overall, that predicted children's ideas about their abilities, but especially parents' attitudes towards failure. Thus, it might be that the feedback that would support low-performing students the best would concern situations of failure, not their overall performance. This is an important issue that would repay further investigation in future studies.

YHTEENVETO (SUMMARY)

Koulukokemukset ovat keskeisiä lasten ja nuorten elämässä. Koulussa opitaan uusia taitoja, luodaan erilaisia vuorovaikutussuhteita, saadaan palautetta ja koetaan onnistumisia ja epäonnistumisia. Oppilaan käsitys omista taidoistaan ja kyvyistään eri oppiaineissa eli oppijaminäkuva vaikuttaa merkittävästi hänen käyttäytymiseensä ja koulunkäyntiin liittyviin valintoihinsa kuten koulumenes-tykseen ja kurssivalintoihin (Eccles Parsons et al., 1983; Musu-Gillette et al. 2015; Valentine et al., 2004). Tutkimuksissa on havaittu, että vanhemmilla (Frome & Eccles, 1998) ja opettajilla (Madon ym., 2001) on tärkeä rooli oppilaiden oppija-minäkuvan kehittymisen kannalta. Vanhempien uskomuksilla on havittu ole- van jopa merkittävämpi rooli oppilaiden oppijaminäkuvan muodostumisessa kuin oppilaan saamista arvosanoilla (Frome & Eccles, 1998).

Aiemmissä tutkimuksissa on kuitenkin yleensä tutkittu pelkästään äitien käsitysten ja uskomusten merkitystä, kun taas isien uskomuksia on tutkittu vä- hemmän. Lisäksi vain harvat tutkimukset ovat tarkastelleet sekä vanhempia että opettajia samassa tutkimuksessa. On vähän tutkimuksia, jotka selvittävät aivan pienimpien koululaisten, ensimmäisellä luokalla olevien oppilaiden, op- pijaminäkuvan ja aikuisten uskomusten yhteyttä. Aiemmin ei ole juurikaan teh- ty tutkimuksia, jotka tarkastelevat mahdollisia eroja vanhempien tai opettajien ja lasten oppijaminäkuvan välisissä yhteyksissä lasten taitotasosta riippuen. Tämä tutkimus pyrki vastaamaan näihin puutteisiin.

Tässä tutkimuksessa selvitettiin, miten vanhempien ja opettajien usko- mukset lapsen kyvyistä ovat yhteydessä tämän oppijaminäkuvaan äidinkielessä ja matematiikassa. Lisäksi tutkittiin, onko vanhempien ja opettajien uskomusten rooli erilainen tytöillä kuin pojilla tai koulussa heikommin menestyvillä kuin koulussa hyvin menestyvillä oppilailla.

Aihetta tutkittiin kolmella eri aineistolla: Vanhemmat, lapset ja oppimi- nen (VALO; LIGHT study, 2016), Koulutaidot ja motivaatio (JEPS study, 2016) sekä TIKAPUU -tutkimusten (STAIRWAY study, 2016) aineistoilla. VALO- tutkimuksessa oppilaat olivat suomalaisia alakoulun ensimmäisellä luokalla olevia oppilaita, JEPS-tutkimuksessa suomalaisia yläkoululaisia ja TIKAPUU- tutkimuksessa suomalaisia kuudes- ja seitsemäsluokkalaisia. VALO-tutkimuk- sessa seurattiin oppilaita heidän ensimmäisen kouluvuotensa ajan. Vanhemmat ja opettajat vastasivat kyselylomakkeisiin lasten syyslukukaudella. JEPS- tutkimuksessa yläkouluikäisiä oppilaita seurattiin seitsemänneltä luokalta yh- deksännelle luokalle ja oppilaiden vanhemmat vastasivat kyselylomakkeisiin oppilaiden ollessa seitsemännellä luokalla. TIKAPUU-tutkimuksessa seurattiin oppilaita, jotka olivat siirtymässä alakoulusta yläkouluun eli kuudennelta lu- kalta seitsemännelle luokalle. Oppilaiden äidit vastasivat kyselylomakkeisiin oppilaiden ollessa kuudennen luokan syyslukukaudella.

Ensimmäinen osatutkimus osoitti, että alakoulun ensimmäisellä luokalla olevilla oppilailla opettajien uskomukset olivat yhteydessä lasten oppija- minäkuvaan äidinkielessä ja matematiikassa. Tämä myönteinen yhteys havait- tiin ainoastaan koulussa hyvin menestyvillä lapsilla. Mitä enemmän opettaja

uskoi oppilaan kykyihin ensimmäisen luokan alussa, sitä parempi oli tämän myöhempi oppijaminäkuva ensimmäisen luokan lopulla hyvin menestyvillä lapsilla. Koulussa heikosti menestyvät lapset eivät vastaavassa määrin hyötynneet opettajan myönteisistä uskomuksista. Vanhempien uskomukset eivät olleet yhteydessä ensimmäistä luokkaa käyvien lasten oppijaminäkuvaan.

Toinen osatutkimus osoitti, että suomalaisilla yläkoululaisilla äitien uskomukset olivat yhteydessä lastensa oppijaminäkuvaan matematiikassa, mutta yhteys oli voimakkaampi koulussa hyvin menestyvillä lapsilla kuin koulussa heikosti menestyvillä lapsilla. Mitä enemmän äiti uskoi lapsensa kykyihin, sitä parempi oli tämän myöhempi oppijaminäkuva matematiikassa. Isien uskomuksilla oli niin ikään myönteinen yhteys lasten matematiikan oppijaminäkuvaan, ja tämä yhteys oli samanlainen hyvin ja heikosti menestyvillä lapsilla.

Kolmas osatutkimus osoitti, että äitien uskomukset ennustivat matematiikan oppijaminäkuvassa tapahtuvaa muutosta, mutta oppilaan taitotaso muovasi äitien uskomusten ja nuorten oppijaminäkuvan yhteyttä. Nuorten matematiikan oppijaminäkuva laski tutkimusajankohtana, mutta koulussa hyvin pärjävillä nuorilla äitien positiiviset uskomukset lastensa kyvyistä lievensi tätä minäkuvan laskua enemmän kuin koulussa heikosti menestyvillä nuorilla.

Opettajilla ja vanhemmilla on näiden tutkimustulosten perusteella tärkeä rooli lasten oppijaminäkuvan kehittymisessä. Opettajien uskomusten rooli korostuu ensimmäisen kouluvuoden aikana. Olisikin tärkeää, että opettajien koulutuksessa tuotaisiin esille opettajien tärkeä rooli oppilaiden oppijaminäkuvan kehittymiselle. Vanhempien ja opettajien uskomukset olivat myönteisesti yhteydessä erityisesti koulussa hyvin menestyvien oppilaiden minäkuvaan. Helposti kuitenkin ajatellaan, että koulussa hyvin pärjäävät oppilaat eivät välttämättä tarvitse aikuisten tukea, vaan he pärjäävät hyvin muutenkin. Tämän tutkimuksen tulokset osoittavat, että hyvät oppilaat hyötывät saamastaan tuesta, ja heitä onkin tärkeä tukea. Vanhemmille ja opettajille tulisi välittää tietoa heidän roolistaan lasten oppijaminäkuvan kehittymisessä. Esimerkiksi opettajat voisivat vanhempainilloissa tuoda tätä näkökulmaa esille ja neuvoa vanhempia siinä, miten he voisivat olla avuksi ja tueksi lastensa koulutaipaleella myös tukemalla lasten minäkuvan kehittymistä.

Tutkimustulokset antavat näyttöä myös sille, että koulussa hyvin ja heikosti menestyvät hyötывät eri tavalla vanhempien ja opettajien tuesta. Tämä on tärkeä ottaa huomioon lasten ja nuorten minäkuvan kehitystä tukevia toimia suunniteltaessa. Syrjäytyminen koulutuksen ja työelämän ulkopuolelle on iso ongelma nyky-Suomessa. Koulussa heikosti pärjäävät oppilaat ovat erityisessä vaarassa jäädä yhteiskunnan ulkopuolelle. Tämän tutkimuksen tulosten mukaan opettajien ja vanhempien positiiviset uskomukset eivät edistä koulussa heikosti pärjäävien oppilaiden minäkuvan kehittymistä. Olisikin tärkeää löytää keinoja tukea myös koulussa heikosti pärjäävien oppilaiden minäkuvan kehittymistä. Tätä aihetta olisi syytä tutkia lisää tulevissa tutkimuksissa.

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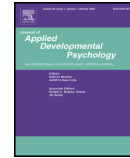
THE ROLE OF PARENTS' AND TEACHERS' BELIEFS IN CHILDREN'S SELF-CONCEPT DEVELOPMENT

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The role of parents' and teachers' beliefs in children's self-concept development



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ABSTRACT

This study examined to what extent parents' and teachers' beliefs about children's abilities predict children's self-concept of math and reading ability development during the first grade, and whether these predictions depend on the child's gender and level of performance. One hundred fifty-two children and their parents and teachers were followed across first grade. The results showed, first, that the associations between teachers' beliefs and children's subsequent self-concept of ability depended on the level of the children's performance. Among high-performers, the higher the teachers' beliefs about their students' abilities in reading or in math, the higher the subsequent level of self-concept of ability. Among low-performers no association was found between teachers' beliefs and students' self-concept of ability in either reading or math. Second, mothers' and fathers' beliefs were not predictive of children's self-concept of math and reading ability during first grade. Overall, these results suggest that during the first grade it is teachers' rather than parents' beliefs, that play a role in children's self-concept of ability. In teacher education, emphasis should therefore be placed on the importance of supporting children's developing self-concept as well as teaching new academic skills.

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Previous research has consistently shown that students' self-perceptions, such as their self-concept of ability, direct their behavior and effort in learning situations (e.g., Atkinson, 1964; Bandura, 1986; Eccles et al., 1983; Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006). It has been suggested that self-concept of ability develops in interaction with other people (Dermitzaki & Efklides, 2000), such as parents and teachers. For example, parents' attitudes and beliefs (McGrath & Repetti, 2000; Tiedemann, 2000) as well as teachers' beliefs (Bohlmann & Weinstein, 2013; Burnett, 2003; Lehtinen, Vauras, Salonen, Olkinuora, & Kinnunen, 1995; Tiedemann, 2000) have been shown to be associated with children's self-concept of ability development. Moreover, parental beliefs have been shown to play an even stronger role in children's self-concept of ability development than children's previous level of performance (e.g., Frome & Eccles, 1998). However, although many studies have examined the roles of parents and teachers in the development of children's self-concept of ability, few efforts have been made to examine these among the youngest students (Wigfield et al., 1997). Moreover, although it might be that high performing children benefit from different kinds of teacher and parental support and feedback than low performing children (Bohlmann & Weinstein, 2013), the possibility that the role of parents' and teachers' beliefs is different depending on the level of children's performance

has thus far not been considered. Consequently, the aim of the present study was to examine the extent to which parents' and teachers' beliefs about children's abilities are associated with children's academic self-concept development during the first grade of primary school and whether these associations differ according to the level of the children's performance.

1. Self-concept of ability

Self-concept of ability refers to an individual's perception of his or her competence in a certain domain (Wigfield & Eccles, 2000). Earlier, the research emphasis was on a global construct, such as general self-concept or self-esteem (for a review, see Bong & Skaalvik, 2003); however, the notion that self-concept is global in nature has since been criticized for overlooking the important distinctions that children make between activity domains (Harter, 1982). Shavelson, Hubner, and Stanton (1976) proposed a multidimensional, hierarchical model of self-concept, with global self-concept at the apex that can be subdivided into academic and nonacademic components. These in turn can be further divided into subdomains, that is, academic self-concept into self-concepts for specific school subjects, and nonacademic self-concept into subdomains such as physical, social and emotional self-concepts. In the present study, self-concept is also approached subject-specifically, as numerous empirical studies have provided support for the domain-specificity of self-concept, meaning that there are distinct math and verbal domains in academic self-concept (Arens, Yeung, Craven, & Hasselhorn, 2011; Marsh & O'Neill, 1984).

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Eccles' expectancy-value theory provides one theoretical framework for students' self-perceptions in the academic context. According to this theory (Eccles et al., 1983; Eccles & Wigfield, 1995; Wigfield & Eccles, 2000), individuals' performance and academic choices are explained not only by the extent to which they value the activity in question but also by the beliefs they have about their own abilities (expectancies for success). Expectancies are presumed to have a direct influence on different academic outcomes, such as performance (Wigfield & Eccles, 2000). Moreover, ability beliefs and the perceived difficulty of a task are assumed to influence expectancies. Eccles et al. (1983) defined ability beliefs as the individual's perception of his/her current competence at a given activity. Hence, the theoretical difference between ability beliefs and expectancies for success is that ability beliefs focus on present ability while expectancies focus on the future. Although, expectancies and ability beliefs are theoretically distinct concepts, empirically they have not been found to be separate (Eccles et al., 1983; Wigfield & Eccles, 1992, 2000). In the present study, we use the term "self-concept of ability" to refer to task-related perceptions of one's abilities (Wigfield & Eccles, 2000).

Previous studies have shown that children have very positive and even unrealistic perceptions of their abilities during the first years of primary school (Aunola, Leskinen, Onatsu-Arivilommi, & Nurmi, 2002; Wigfield & Eccles, 2000). As they grow older, their perceptions of their abilities become more realistic and more negative (Dweck, 2002; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002). For example, Dweck (2002) showed that children start to view their abilities more realistically at the age of 7–8. According to Dweck (2002), one reason for this change is that, around this age, children become more responsive to performance feedback. The stability of inter-individual differences in self-concept has also been shown to increase over time. For example, Aunola et al. (2002) found that children's relative standings on their self-concept of ability were very unstable during their first months of primary school, but became relatively stable by the end of the first grade. Overall, the first grades of primary school seem to be an important developmental period for the development of self-concept of ability. Besides the development of cognitive reasoning skills during this period, a whole new social context becomes a part of the child's everyday life: the child starts to receive everyday feedback from teachers and classmates become points of comparison.

2. The role of parents and teachers

It has been suggested that self-perceptions are formed in interaction with one's environment, and are influenced by evaluations by significant others and by reinforcements of, and attributions for, one's behavior (Bong & Skaalvik, 2003; Eccles et al., 1983; Gniewosz, Eccles, & Noack, 2014; Shavelson et al., 1976). For example, according to the Eccles' Expectancy-value model, parental beliefs play an important role in students' ability beliefs (Eccles, 1993). According to the expectancy-value model, the links between parental beliefs and students' achievement-related perceptions can be explained by at least two mechanisms (Eccles, 1993; Eccles et al., 1983; Simpkins, Fredricks, & Eccles, 2012): First, parents can communicate their beliefs to their children directly by encouraging them to do better in school or by giving them positive feedback when they do well in school (Gniewosz et al., 2014); second, parents may communicate their beliefs indirectly through the way they behave with their children, such as by the act of helping children with their schoolwork.

Empirical support has also been found for the assumption that parents' beliefs about their children's academic performance are associated with children's subject-specific self-concept of ability (Eccles Parsons, Adler, & Kaczala, 1982; Frome & Eccles, 1998; Gniewosz, Eccles, & Noack, 2012; Jacobs, 1991; Lau & Pun, 1999; McGrath & Repetti, 2000; Phillips, 1987). For example, among fifth- to eleventh-graders, Eccles Parsons et al. (1982) found that parents who considered that their child did not perform well in math, and that math was difficult for

their child, had children whose math-related self-concept was particularly low. Similarly, parents' beliefs have been found to be positively related to sixth-grade children's self-concept of ability in English (native language) (Frome & Eccles, 1998). These associations remained even after controlling for the previous level of children's performance (Frome & Eccles, 1998). Recently, Gniewosz et al. (2014) found that parents' perceptions of their children's abilities mediated the connections between school grades and students' academic self-concept in both math and native language among fifth- to seventh-graders.

Some gender differences in parental beliefs have also been reported. For example, parents tend to think that mathematics is more difficult for girls than for boys (Eccles Parsons et al., 1982; Eccles & Jacobs, 1987; Gunderson, Ramirez, Levine, & Beilock, 2012), independently of children's actual performance in mathematics (Eccles, 1993; Eccles Parsons et al., 1982), a belief which has been shown to impact girls' self-perceptions in mathematics (Jacobs, 1991). Girls, in turn, are typically thought to do better in native language (Gniewosz et al., 2014; Wigfield & Eccles, 1992). It has been further shown that parents of girls tend to overestimate and parents of boys to underestimate their child's ability in native language (English) (Frome & Eccles, 1998). These studies on gender differences in parental beliefs have not focused on children who have just begun their school career, and hence this age group is the focus of the present study.

Besides parents' beliefs, teachers' beliefs and expectations have also been shown to impact students' self-perceptions. For example, teachers' expectations of students' abilities have been shown to relate to students' self-concept of abilities in both mathematics (e.g., Madon et al., 2001) and reading (e.g., Brattesani, Weinstein, & Marshall, 1984). Madon et al. (2001) found that teachers' positive beliefs predicted positive changes in sixth-grade students' mathematics self-perceptions. Brattesani et al. (1984), in turn, found that teachers' expectations were positively associated with students' own expectations and performance in reading among fourth- to sixth-grade students. Moreover, it has been found that teachers' evaluations play a larger role in third- to fourth-graders' general self-concept (i.e., children's perceptions of their general school-related ability) than parents' perceptions (Spinath & Spinath, 2005). Teacher evaluations of student's performance have also been found to correlate highly with objective measures of school performance (e.g., Hoge & Coladarci, 1989). However, there is evidence that although teachers are good at perceiving students' visible performance in the classroom (Hoge & Coladarci, 1989), they do not necessarily perceive their students' underlying cognitive capacities. For example, it has been shown that teachers are not good at detecting under-achievers, that is, students who have high abilities but show low school performance (e.g., Rost & Hanses, 1997).

Like parents, teachers also seem to show a gender bias in their beliefs about students' abilities, at least in the domain of mathematics (for a review, see Li, 1999; Gunderson et al., 2012). Teachers have been shown to be prone to stereotype mathematics as a male domain (Li, 1999). For example, Tiedemann (2000) found that German teachers of third-through fourth-grade students believed that mathematics is a more difficult subject for girls than for boys, and that average-achieving girls are less logical than equally achieving boys. It has been found that even preschool-aged children are susceptible to these kinds of gender stereotypes, at least in the mathematics domain (Ambady, Shih, Kim, & Pittinsky, 2001).

Overall, both parents' and teachers' beliefs have been shown to be associated with students' self-concept of ability, while some gender differences, favoring boys over girls in mathematics and girls over boys in native language (English), in these beliefs have also been found (Frome & Eccles, 1998). The earlier research on the topic has, however, some limitations. First, research focused on the role of both teachers' and parents' beliefs is rare (for an exception, see Spinath & Spinath, 2005). There is, however, some evidence indicating that the importance of teacher evaluations for children's ability self-perceptions may increase and the importance of parents' evaluations may decrease during grades

1–4 (Spinath & Spinath, 2005). Secondly, although many studies have examined the antecedents of self-concept of ability, few efforts have been made to examine these among the youngest students (Wigfield et al., 1997). Because self-concept of ability becomes stable very early on during the school career (Aunola et al., 2002), the first school year in particular is an important period in which to track its development. Consequently, the first aim of the present study was to examine the role of parents' and teachers' beliefs about children's abilities in reading and mathematics in the development of children's self-concept of ability during the first grade of primary school. Possible differences in these associations depending on child's gender were also investigated.

3. The moderating role of child's level of performance

Previous research on the relation between parental and teacher beliefs and child's self-perceptions has assumed that high teacher (e.g., Tiedemann, 2000) and parental beliefs (Eccles Parsons et al., 1982; Frome & Eccles, 1998) are positively associated with a child's own beliefs. However, because children's level of cognitive ability has been shown to be positively related to both their self-perceptions (Bohlmann & Weinstein, 2013) and the teacher–child relationship (Jerome, Hamre, & Pianta, 2009), there are grounds for assuming that – because cognitive abilities strongly correlate with academic performance (Dermitzaki & Efklides, 2000) – the associations between teacher beliefs and child's self-perceptions are not necessarily the same for low- and high-performing children. Also, according to Bohlmann and Weinstein (2013), children's cognitive reasoning skills affect the way they perceive, interpret, and attribute meaning to teachers' actions. They argued that “interpreting performance feedback may depend on the ability to coordinate multiple forms of feedback and logically analyze the meaning of positive versus negative messages in application to the self” (p. 290). Following this line of reasoning, it might be assumed that high-performing children are more prone to be influenced by adults' beliefs than low-performing children as (due to their cognitive abilities) they are able to make more accurate interpretations of adults' feedback and performance. However, no studies thus far have investigated whether the impact of parental and teacher beliefs on children's self-perceptions differs according to the level of the child's performance. Consequently, the second aim of the present study was to examine whether the role of parents' and teachers' beliefs in the development of children's self-concept of ability during the first grade of primary school differs according to the level of the child's performance.

The present study was carried out in Finland. Finnish children start their education by attending pre-school (kindergarten), which begins in the year of the child's sixth birthday. One year later, in the year of their seventh birthday, children make the transition to compulsory comprehensive school. One important difference in the transition from kindergarten to primary school in Finland compared to some other countries is that Finnish children are one to two years older than their counterparts in many other countries when they start formal education. Hence, the first graders participating in the present study are 7- to 8-year-olds.

4. Method

4.1. Participants

The participants of the study consisted of 152 first graders (79 girls, 73 boys; age ranging from 6 years 9 months to 8 years 8 months, $M = 7.5$ years) and their teachers and parents. The sampling was started by contacting 334 first-grade teachers in three medium-sized towns in Finland and asking them to participate in the study. One hundred sixty-six teachers agreed to do so and signed a written consent. Next, one student from each classroom ($n = 166$) was randomly selected, and the students' parents were asked to give their consent to their child's participation. If the parents did not respond or refused consent,

another child from the classroom was selected, again at random, and his or her parents were contacted. This procedure continued until one student from each classroom was selected. One hundred fourteen parents gave their consent in the first round, 33 in the second round, 15 in the third round, and 4 in the fourth round. Of this total of 166 children, 14 children and their mothers were omitted from the analyses because the children were in special education classrooms. Thus, the final sample comprised 152 children in normal classrooms, and their mothers, fathers and teachers. The reason for selecting only one child per classroom was that, as part of the data gathering, teachers were asked to fill in diary questionnaires on their interaction with the target children. It was considered that having more than one child per classroom would add excessively to the teacher's workload.

The families were fairly representative of the general Finnish population. 52% of the mothers and 31% of the fathers had at least an upper secondary school education, 47% of the mothers and 66% of the fathers had at least a comprehensive school education (all 9 grades), and 1% of the mothers and 3% of the fathers had not completed comprehensive school. 78% of the families were nuclear families (67 married, 11 cohabiting parents), 12% blended families, and 10% single-parent families. The number of children per family ranged from 1 to 10 ($M = 2.39$, $SD = 1.03$).

Women comprised 94.8% of the participating teachers. Mean years as a teacher was 16.0 years ($SD = 10.5$ years) and mean years as a first- or second-grade teacher was 7.5 years ($SD = 7.5$ years).

The children were interviewed in the fall (October; Time 1) and spring (April; Time 2) semesters of their first-grade year on their self-concept of ability in math and reading. The children's performance in reading and mathematics was also tested in the fall semester (Time 1). The children's mothers, fathers, and teachers answered a questionnaire on their beliefs and expectations concerning the child's abilities and provided some background information in the fall semester (October; Time 1). Mothers and fathers were paid 50 EUR (54.20 USD) and teachers 100 EUR (108.30 USD) for their participation in the study.

4.2. Measures

4.2.1. Self-concept of ability

Children's mathematics- and reading-related self-concepts were measured using a questionnaire modified from the scale developed by Eccles et al. (Wigfield et al., 1997). Three questions measured mathematics-related self-concept (e.g., *How good are you at mathematics and counting?*) and three reading-related self-concept (e.g., *How good are you at reading and knowing letters?*). After each question, the child was shown a set of five squares increasing in size from a very small square which was scored 1 (“not very good”) to a large square scored 5 (“very good”). The child was asked to answer by pointing to the square which best described his/her skills in a particular school subject. Cronbach's alpha reliabilities were .55 and .66 for mathematics-related self-concept and .70 and .53 for reading-related self-concept at Time 1 and Time 2, respectively.

4.2.2. Mothers', fathers' and teachers' beliefs

Mothers, fathers, and teachers were asked for their expectations concerning the target child's success at school via questionnaires (Aunola et al., 2002; Aunola, Nurmi, Lerkkanen, & Rasku-Puttonen, 2003). The scale consisted of a set of items modified from the questionnaires used by Eccles Parsons et al. (1982). Two of these items measured expectations concerning the children's reading skills (*How well do you think your child/the target child is doing in reading?*; *How well do you think your child/the target child will do in reading later in school?*) and two items measured expectations concerning the children's mathematics skills (*How well do you think your child/the target child is doing in mathematics?*; *How well do you think your child/the target child will do in mathematics later in school?*). Each parent, separately, and teachers answered the questions on a 5-point Likert-scale (1 = “poorly”, 5 =

“very well”). Cronbach's alphas for their beliefs in mathematics and reading were: for mothers .74 and .75, respectively; for fathers .72 and .76; and for teachers .88 and .88.

4.2.3. Children's mathematics performance

Children's mathematics performance was measured by two tests:

- (1) Children's knowledge of cardinal numbers and basic mathematical concepts (e.g., equal, more, less), was measured by 11 tasks that became progressively more difficult (Ikäheimo, 1996). In each task, the children were shown a picture of a set of balls and asked to draw a specific number of balls in the blank space provided (e.g., *Draw as many balls as there are in the model; Draw five balls fewer than there are in the model; Draw four balls more than there are in the model*). One point was given for each correct answer.
- (2) In the basic arithmetic test, children's skill level in basic arithmetic was assessed using a set of visually presented addition (e.g., '9 + 3 = ?'; '86 + ? = 93') and subtraction (e.g., '11 - 2 = ?'; '57 - ? = 48') tasks. The test comprised a total of 20 tasks. The children were asked to complete as many of the tasks as they could. One point was given for each correct answer.

A total score for children's performance in mathematics in the fall semester (Time 1) of first grade was arrived at by calculating a sum score from the points scored in the knowledge of cardinal numbers and basic arithmetic tests. The split-half reliability for the score was .86. The test-retest reliability of the measure was .70 ($p < .001$).

4.2.4. Children's reading performance

Children's reading performance was assessed by two subtests:

- (1) In the reading words test, children were asked to read aloud a set of 20 words of progressive difficulty. The level of difficulty was increased mainly through the use of words of increasing length (e.g., “ja” (and), “isä” (dad), “ikkuna” (window), “tulitikku” (match)). The test was discontinued if the child was unable to read four successive items correctly. One point was given for each correctly read word, yielding a maximum score of 22. The split-half reliability for the reading words test was .80. This subtest is known to be sensitive to the early stages of reading (see Leppänen, Niemi, Aunola, & Nurmi, 2004).
- (2) In the oral reading fluency test, the task for the children was to read aloud, to their best ability, a short story in an individual test situation. The story consisted of 57 words. The score for

oral reading fluency was computed by dividing the number of words read correctly by the time (in seconds) it took for the child to read the whole story. This score has been shown to correlate with teacher assessments of children's reading performance ($r = .66-.79$; Parrila, Aunola, Leskinen, Nurmi, & Kirby, 2005). This subtest is known to be sensitive to more advanced reading skills (see Leppänen et al., 2004).

A total score for children's reading performance in the fall semester of the first grade (Time 1) was arrived at by calculating a mean score from the standardized scores (z-scores) for reading words and oral reading fluency. The Pearson moment correlation between the two subtests was .41 ($p < .001$). The test-retest reliability of the measure was .56 ($p < .001$).

5. Results

The means (M), standard deviations (SD), and correlations of the variables used are shown in Table 1. The correlations (Table 1) showed positive associations between self-concept of ability at the end of the first grade (Time 2) and children's previous level of performance and mothers', fathers' and teachers' beliefs in both the domains of reading and mathematics (Time 1), justifying the further analyses examining to what extent children's previous level of performance and parents' and teachers' beliefs predict the development of children's self-concept of ability.

The research questions were analyzed using hierarchical regression analysis. The effect of teachers', mothers', and fathers' beliefs on children's self-concept development was first tested each in separate analyses to find out which of these belief variables are potential predictors of children's self-concept development. In these analyses, children's self-concept of ability in a specific school subject at the end of the first grade (Time2) was predicted by their self-concept of ability in that subject in the fall (Time1), academic performance in that subject in the fall (Time1), gender, and mothers'/fathers'/teachers'beliefs in the fall (Time1). Each variable was entered stepwise in the analysis. In order to determine whether any connections observed between parental or teacher's beliefs and the child's subsequent level of self-concept of ability was influenced by the child's gender or by the child's level of performance, the related interaction terms (Gender \times Belief or Academic Performance \times Belief) were added to the analysis in the last step. Each interaction term was tested in a separate analysis. The analysis was carried out separately for mathematics-related self-concept of ability and reading-related self-concept of ability. All the predictor variables were

Table 1
Intercorrelations, means (M), and standard deviations (SD) for the study variables.

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Self-concept Finnish T1													
2. Self-concept Finnish T2	.24 ^a												
3. Self-concept Math T1	.20 ^b	.24 ^a											
4. Self-concept Math T2	.15	.31 ^a	.42 ^a										
5. Performance Finnish T1	.46 ^a	.25 ^a	.05	.07									
6. Performance Math T1	.25 ^a	.13	.10	.22 ^a	.49 ^a								
7. Gender	.03	.04	.20 ^b	.24 ^a	-.14	.08							
8. Teacher belief Finnish T1	.34 ^a	.28 ^a	.11	.10	.70 ^a	.56 ^a	-.16						
9. Teacher belief Math T1	.24 ^a	.25 ^a	.20 ^b	.25 ^a	.43 ^a	.57 ^a	.09	.65 ^a					
10. Mother belief Finnish T1	.35 ^a	.22 ^a	.06	.10	.67 ^a	.34 ^a	-.19 ^b	.69 ^a	.40 ^a				
11. Mother belief Math T1	.20 ^a	.19 ^b	.32 ^a	.32 ^a	.34 ^a	.41 ^a	.05	.42 ^a	.52 ^a	.45 ^a			
12. Father belief Finnish T1	.47 ^a	.28 ^a	.08	.12	.63 ^a	.31 ^a	-.15	.69 ^a	.43 ^a	.70 ^a	.22 ^b		
13. Father belief Math T1	.29 ^a	.24 ^b	.32 ^a	.21 ^b	.30 ^a	.31 ^a	.03	.42 ^a	.48 ^a	.34 ^a	.39 ^a	.53 ^a	
M	3.90	4.28	4.36	4.13	-0.18	15.38		3.88	4.05	3.93	4.26	3.94	4.15
SD	1.02	0.69	0.72	0.70	0.82	4.48		0.93	0.81	0.82	0.64	0.75	0.62

Note. T1 = Time 1, T2 = Time 2.

^a $p < .01$.

^b $p < .05$.

^c $p < .001$.

standardized before they were added into the regression models and before calculating any interaction terms. In the tested models, no serious multicollinearity among predictor variables was evident (range of tolerance values in different models was .40–.96; range of VIF values in different models was 1.04–2.66). The results of the analyses on the role of teachers' beliefs for self-concept of reading ability are shown in Table 2 and for self-concept of mathematics ability in Table 3. The results of the analyses concerning the role of mothers' and fathers' beliefs are presented in the text.

To find out whether the results remain the same if teachers' and parental beliefs are included simultaneously in the models, analyses in which teachers' and parental beliefs were included in the same model were also carried out. In these models, the beliefs of different agents, i.e. beliefs of mothers, fathers, and teachers, were entered into the models stepwise. In this context, different kinds of models were tested with different orders of the belief-variables in the model. Because the results of these more complex models did not differ from the results found when testing the effects of mothers', fathers' and teachers' beliefs separately, we report in detail only the more parsimonious models that were tested first.

5.1. Reading-related self-concept

The results for reading-related self-concept showed, first, that children's self-concept at the end of the first grade was not predicted by either their previous self-concept of reading ability, previous reading performance, or gender (see Table 2). Second, the results showed that, after controlling for the previous level of self-concept and reading performance, mothers' ($\beta = 0.10, p = .35$) and fathers' beliefs ($\beta = 0.19, p = .13$) did not predict children's self-concept at the end of the first grade. No Parental Belief \times Gender or Parental Belief \times Performance interaction effects were found either. Third, the results showed that teachers' beliefs marginally ($p < .10$; see Table 2) predicted children's subsequent reading-related self-concept: the higher the teachers' beliefs concerning children's reading ability at the beginning of the first grade, the higher the self-concept of reading ability the children reported at the end of the first grade, after controlling for the previous level of self-concept and reading performance. The results showed further, however, that the interaction term Teacher Belief \times Reading Performance was statistically significant, suggesting that the association between teachers' beliefs and children's subsequent self-concept of ability differed depending on the level of the child's performance. To examine this interaction effect further, Aiken and West's (1991) procedure was used. In this procedure, simple slopes for the teacher belief variable in the prediction of children's reading self-concept were

Table 2
The results of hierarchical regression analyses for the role of teachers' beliefs (Time 1) for reading related self-concept at Time 2 (standardized betas).

Predictor	Reading related self-concept at Time 2				
	Step 1 β	Step 2 β	Step 3 β	Step 4 β	Step 5 β
A. Self-concept (Time 1)	.24**	.16 [†]	.15 [†]	.14	.14
B. Performance (Time 1)		.18 [†]	.19 [†]	.05	.05
C. Gender			.06	.07	.07
D. Teacher beliefs (Time 1)				.21 [†]	.24
E. Interaction terms					
C \times D					-.04
B \times D					.17*
Total R ²	.06	.08	.08	.11	.11–.13 ^a

Note. Both interaction terms were tested in separate analyses.

^a R² varies depending on which interaction term is included in the model as a predictor variable.

[†] $p < .10$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3

The results of hierarchical regression analyses for the role of teachers' beliefs (Time 1) for math related self-concept at Time 2 (standardized betas).

Predictor	Math related self-concept at Time 2				
	Step 1 β	Step 2 β	Step 3 β	Step 4 β	Step 5 β
A. Self-concept (Time 1)	.42***	.40***	.37***	.36***	.36***
B. Performance (Time 1)		.18*	.17*	.11	.12
C. Gender			.15*	.15*	.15 [†]
D. Teacher beliefs (Time 1)				.10	.23
E. Interaction terms					
C \times D					-.14
B \times D					.28**
Total R ²	.18	.21	.23	.24	.24–.30 ^a

Note. Both interaction terms were tested in separate analyses.

^a R² varies depending on which interaction term is included in the model as a predictor variable.

[†] $p < .10$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

calculated and presented using standardized scores separately for children who showed either low (-1 SD) or high ($+1$ SD) levels of reading performance. The results are shown in Fig. 1.

The results (Fig. 1) showed that among children with high reading performance, teachers' beliefs about the children's success in reading at Time 1 positively predicted the children's reading self-concept at Time 2 ($t = 2.84, p < .01$): the higher the teachers' beliefs at the beginning of the first grade (Time 1), the better the children's self-concept of ability at the end of the first grade (Time 2), after controlling for the previous level of self-concept of ability (Time 1). Among children with low initial reading performance, in turn, teachers' beliefs in the child's success in reading did not show this positive impact ($t = 1.05, p = 0.30$).

5.2. Mathematics-related self-concept

The results (see Table 3) for mathematics-related self-concept showed, first, that children's self-concept of ability at the end of the first grade (Time 2) was positively predicted by their previous level of self-concept of ability (Time 1) but not by their previous level of mathematics performance (Time 1). Second, neither mothers' ($\beta = 0.16, p = .06$) nor fathers' beliefs ($\beta = 0.05, p = .62$) (Time 1) predicted children's subsequent self-concept of mathematics ability after controlling for the previous level of self-concept and mathematics performance. No Parent Belief \times Gender or Parent Belief \times Performance interaction effects were found either. Third, the results showed that although teachers' beliefs had no main effect on the self-concept of mathematics ability, the interaction term Teacher Belief \times Mathematics

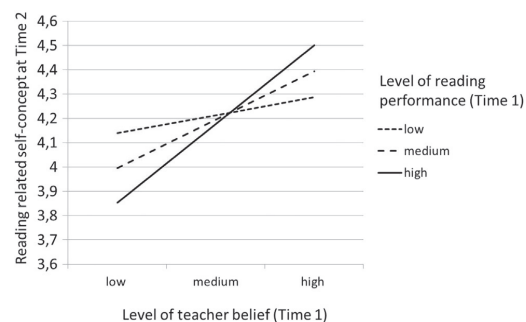


Fig. 1. The impact of teachers' beliefs (Time 1) on students' reading related self-concept (Time 2) among low, medium and high-performing students.

Performance was statistically significant, suggesting that the association between teachers' beliefs and children's self-concept of mathematics ability differed depending on the level of the child's mathematics performance. To examine this interaction effect further, simple slopes for the teacher belief variable in the prediction of children's mathematics self-concept were calculated and presented using standardized scores separately for children who showed either low (-1 SD) or high ($+1$ SD) levels of mathematics performance. The results are shown in Fig. 2.

The results showed (see Fig. 2) that among children with high mathematics performance, teacher's positive beliefs about these children's success in mathematics (Time 1) positively predicted the development of the children's self-concept of mathematics ability ($t = 3.77, p < .001$): among high performing children, the higher the teachers' beliefs at the beginning of the first grade, the higher the children's subsequent self-concept of mathematics ability at the end of the first grade, after controlling for the previous level of self-concept of ability and mathematics performance. Among children with lower initial mathematics performance, teachers' beliefs in child's success in mathematics did not have this positive impact ($t = 1.11, p = .91$).

To account for the possible impact of parental socioeconomic status (SES) on the results, all the analyses were also carried out with the inclusion of SES as one of the predictor variables. Controlling for SES did not, however, impact any of the results reported above. Finally, all analyses were also carried out by including mothers', fathers', and teachers' beliefs as predictor variables in the same analyses (i.e., their effects were tested simultaneously). The pattern of results remained the same as reported above.

6. Discussion

The present study aimed to contribute to the literature on the topic by examining what role mothers', fathers' and teachers' beliefs concerning children's abilities in reading and mathematics might play in the development of children's self-concept of ability during the first grade. Also examined was whether these possible associations are influenced by the child's gender or level of performance. The results showed that the role of teachers' beliefs on children's self-concept of mathematics and reading ability was dependent on the level of the children's performance. Among high-performing students, higher teacher beliefs predicted subsequent positive self-concept of ability in both reading and mathematics, whereas among low-performing students, no such positive association was observed. Although parents' beliefs were associated with children's self-concept of mathematics and reading abilities at the beginning of the first grade, they were not found to predict children's self-concept of ability by the end of the first school year.

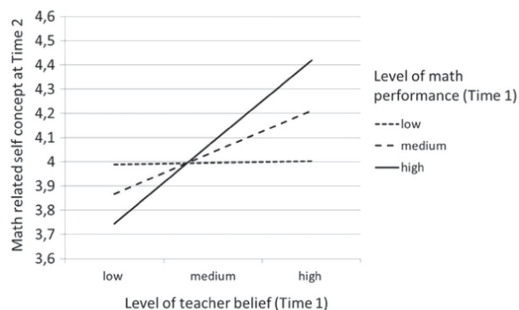


Fig. 2. The impact of teachers' beliefs (Time 1) on students' math related self-concept (Time 2) among low, medium and high-performing students.

6.1. The role of teachers' beliefs in children's self-concept development

The results of the present study showed, first, as could be expected on the basis of previous studies, that both teachers' and parents' beliefs about children's abilities were positively correlated with children's self-concept of ability in mathematics (Eccles Parsons et al., 1982; Frome & Eccles, 1998; Tiedemann, 2000) and reading (Frome & Eccles, 1998) among Finnish first-graders. Further, the results indicated that although parents' beliefs were positively associated with children's self-concept, it was teachers' beliefs in particular that predicted children's self-concept of ability by the end of the first school year in both reading and mathematics. This prediction was, however, dependent on the level of the children's performance. Among children whose performance level was initially high, teachers' beliefs positively predicted self-concept of ability: the higher the teachers' beliefs, the higher the students' subsequent self-concept of ability. Among children with a low performance level this positive prediction was not found. This result was obtained for both reading and mathematics. The finding of a positive relationship between teachers' beliefs and children's self-concept of ability is in line with the findings of several previous studies (Blumenfeld, Pintrich, Meece, & Wessels, 1982; Brattesani et al., 1984; Madon et al., 2001; Spinath & Spinath, 2005). However, the present results add to the literature by showing that the positive association of teachers' beliefs with students' self-concept was particularly evident among high-performing students.

The result showing *no* relationship between teachers' beliefs and students' self-concept of ability among low performing children, in turn, is interesting and has several possible explanations. First, it is possible that teachers communicate their beliefs, even where they are equally positive, differently to children with different performance levels. If so, this means that the effect of these beliefs will also be different for children who perform differently. Previous research has shown that teachers treat low- and high-performers differently. For example, Blöte (1995) found that both students and teachers perceived that low-performers receive more help and support from their teachers and are put under less pressure than high-performers. Second, Wigfield and Harold (1992) found that teachers' perceptions of children and children's own achievement self-perceptions were only modestly related. According to them, the reason for these modest relations could be that teachers' beliefs form only one source of information for children; namely, children also get information, for example, from their own previous performance, the performance of peers, and messages from their parents. Thus, it is possible that low-performing children do not benefit from positive teacher beliefs because other feedback concerning their skills (e.g., performance outcomes, peer influences and comparisons) might have a stronger effect on their self-concept than teachers' beliefs. Third, it is possible that students interpret teacher's cues about their beliefs differently depending on their level of performance. Students with a poor level of performance might see positive teacher feedback as special attention given by the teacher because the student is doing badly at school. For example, a child might interpret positive feedback from the teacher, not as a reflection of her or his actual performance, but rather as signaling a need for extra practice, trying harder, etc. In contrast, students with a high level of performance may interpret positive teacher feedback as an indication of their high achievement. Fourth, false beliefs by teachers could explain why teachers' high beliefs had no impact on students' self-concept of ability among low-performing children. It might be that, in the case of low-performers, teachers' beliefs in their success give these children the wrong messages about their level of performance, which would explain why teachers' positive beliefs had no positive impact on the self-concept of low-performing students. On the other hand, abilities can be seen not only as stable internal capacities but also as affected by, for example, effort (Dweck, 2002). Thus, children who were categorized as low-performers in this study might have the potential for doing better if they put more effort into their tasks. Seen from this perspective,

teachers can believe in low-performing students' potential for achievement, without having a false perception of the student. It is also possible that teachers' beliefs and high-performing students' self-concepts concur because there might be more frequent daily communication taking place between teachers and high-performing students concerning students' performance. This interaction might also be more constructive and positive in the case of high performing students. Finally, as Bohlmann and Weinstein (2013) argue, children's cognitive abilities influence their perceptions and interpretations of teachers' actions. Accordingly, it might be assumed that high-performing children have better cognitive abilities to accurately perceive and interpret teachers' beliefs from teachers' behaviors. However, it is possible that our data include underachieving students, that is, students who show low performance despite having the potential to do better. Among such underachievers, poor cognitive competence in interpreting social cues cannot be adduced to explain the finding.

The present study is one of the few to offer information about the possible role of teachers in the case of young students. Most previous studies have been conducted with students older than first graders. However, the age of the present students, i.e., 7–8 years, can be assumed to be an important developmental period in which to study the role of teachers in children's self-perceptions, as it is during this period that children become more responsive overall to performance feedback (Dweck, 2002). Our results are in line with this observation on children's development by showing that teacher beliefs are related to the self-concept development of 7- and 8-year-olds, at least among those who are performing relatively well in school.

6.2. The role of parents' beliefs in children's self-concept development

Based on the literature, it was surprising that in the present study parents' beliefs did not predict children's self-concept of mathematics and reading ability development. This result contradicts previous findings indicating that parents' beliefs about children's abilities also play a role, stronger even than that of children's previous level of performance, in children's self-concept of math and reading ability development (e.g., Frome & Eccles, 1998). It has been argued that parents' perceptions concerning their children are a major determinant of children's self-beliefs (e.g., Eccles Parsons et al., 1982; Frome & Eccles, 1998). However, parents do not have the same first-hand social comparison information as teachers about children's school achievement (Spinath & Spinath, 2005). One explanation for the present result that parental beliefs did not predict children's self-concept of ability is that the connection between parental beliefs and students' self-concept varies at different ages (e.g., Gniewosz et al., 2012). Previous research on the role of parental beliefs in children's self-perceptions has focused on older school-aged children than those in the present study. Eccles (1993) points out that parents rely heavily on objective feedback (e.g., school grades) when forming their impressions of their children's abilities. It is possible that during the first school years not only children but also parents form ideas about children's abilities. Thus, it might be that the first school years are crucial in the development of both children's self-concept of ability and parental belief systems concerning their children. This could explain why the teacher's role in the development of children's self-concept of ability was emphasized during the first grade. Furthermore, it should be noted that self-concept was examined in the domains of mathematics and reading ability in the present study. Teachers assess students' achievement frequently and obtain much information about students' learning in daily classroom situations. Thus, teachers have first-hand information about students' mathematics and reading abilities. Teachers can observe the learning processes and achievement of their students, and they frequently give students information on their academic performance. It is possible that parents have a stronger impact on students' self-concept development in some other domains. In the future, it would be interesting to examine the effects of both parents' and teachers' beliefs simultaneously

over a longer period of time and across different self-concept domains in order to gain a better understanding of the developmental dynamics between children's performance, adults' beliefs about children's performance, and children's self-concepts.

6.3. Gender differences

In the present study, no effect was found for the child's gender on the development of self-concept of ability in either mathematics or reading. This is inconsistent with the results of previous studies, where girls have shown a poorer self-concept of mathematics ability (Eccles Parsons et al., 1982) but a higher self-concept of English (native language) than boys (Frome & Eccles, 1998). In this connection, it is noteworthy that it is explicitly stated in the Finnish national curriculum guidelines that teachers should focus on motivating both boys and girls equally to learn and to help them build a positive self-concept. Moreover, since Finland can be considered an egalitarian culture (Chiu & Klassen, 2009, 2010), there might be fewer gender differences overall. This could offer one explanation for the absence of a gender effect on the development of self-concept of ability. Thus, it is possible that gender differences in children's self-concept of ability development are weaker in the Finnish culture compared to, for example, the North-American culture. Moreover, gender did not have an effect on the relationship between teachers' and parents' beliefs and children's self-concept of ability development. This result is in line with a previous study on Finnish students that found no difference in the associations of parental causal attributions with children's self-concept of math ability between parents of boys and parents of girls (Rytkönen, Aunola, & Nurmi, 2007).

6.4. Limitations

The present study has its limitations. First, the reliability of self-concept measures was not very high. One factor that may have reduced the reliability in the present study was the small number of items measuring each construct (see Wells & Wollack, 2003). Second, the study was carried out in just one educational setting, Finland. Because it is possible that parental and teacher beliefs play a different role in students' self-perceptions in different educational settings and cultures, further cross-cultural research on the topic is needed. Third, the children in this study were followed up for one year only. It would be valuable to utilize a longer time frame in future studies. Fourth, in this study self-concept of ability was studied with quantitative methods, i.e., through interviews and questionnaires. Qualitative methods might capture the phenomenon in a different way. Since self-concept includes perceptions of oneself, and is multidimensional, children can find it hard to express their perceptions by answering direct questions. It might be easier for children to express their perceptions through, for example, stories or pictures, which could then be analyzed qualitatively. Such an approach could make for a broader understanding of students' perception. Fifth, although a longitudinal procedure was used, it is possible that some third factor not controlled for explains the predictions found. One should, therefore, be cautious before making any judgments about the possible causality of our results. Finally, since the students participating in the present study were quite young, it was not possible to reliably measure how they perceived their teachers' beliefs. Information about these perceptions might provide some explanations for the results. Consequently, in future research there is a need to study whether children's perceptions of their teachers' beliefs impact students' self-perceptions.

6.5. Practical implications

The results of the present study can be capitalized on in teacher education programs. For example, the fact that teachers' beliefs are associated with children's self-concept of ability development, particularly

among high-performing children, suggests that these beliefs may also contribute to the development of underachievement among high-performing children, and hence that they should be taken into account when considering how best to support children with different performance levels in the classroom. In teacher education, it should be emphasized that it is important that teachers support children and their developing self-concept, and not only teach children new academic skills. Moreover, the results of the present study indicate that for low-performers the role of teachers' beliefs in self-concept development is not positive, as it is for high-performing students. Although it would seem that high- and low-performers may benefit from different kinds of teacher support, further studies are needed to ascertain the mechanism behind the associations reported in the present study. For example, one further line of research is to clarify to what extent teachers' beliefs are reflected in the feedback they give students and whether low-performing children would benefit, for example, from more specific feedback rather than feedback on domain-specific skills in general.

Overall, the results of the present study suggest that during the first grade it is teachers' beliefs, in particular, that play a role in children's self-concept of ability. However, the connection between teachers' beliefs and children's self-concept of ability seems to differ depending on the level of the child's performance.

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II

THE DEVELOPMENT OF ADOLESCENTS' SELF-CONCEPT OF ABILITY THROUGH GRADES 7-9 AND THE ROLE OF PARENTAL BELIEFS

by

Laura Pesu, Kaisa Aunola, Jaana Viljaranta, & Jari-Erik Nurmi, 2016

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The Development of Adolescents' Self-concept of Ability through Grades 7-9 and the Role of Parental Beliefs

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Abstract

This study examined the development of adolescents' self-concept of ability in mathematics and literacy during secondary school, and the role that mothers' and fathers' beliefs concerning their child's abilities play in this development. Also examined was whether the role of mothers' and fathers' beliefs about their adolescent child's ability in mathematics and literacy differs according to the adolescent's gender and level of performance. A total of 231 adolescents and their mothers and fathers were followed up across secondary school. The results showed, first, that adolescents' self-concept of ability declined slightly from grade 7 to grade 9 in both mathematics and literacy. Second, mothers' and fathers' beliefs about their adolescent child's abilities in grade 7 predicted the child's subsequent self-concept in grade 9, but only in mathematics. Third, the role of mothers' beliefs in their child's self-concept of mathematics ability was found to be stronger among high-performing than low-performing adolescents.

Keywords: self-concept of ability; secondary school; mother's beliefs; father's beliefs



1. Introduction

Students' self-concept of ability in different academic domains, that is, the knowledge and perceptions individuals have of themselves in a particular subject area (Bong & Skaalvik, 2003; Brunner, Keller, Hornung, Reichert, & Martin, 2009) influences their academic performance and the academic career-related choices they make (Eccles et al. 1983; Marsh, Trautwein, Lüdtke, Köller, & Baumert, 2005; Valentine, DuBois, & Cooper, 2004; Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006). Since these self-conceptions guide students' actual performance at school and hence their future education and related decisions, it is important to identify the factors that support the development of self-concept, particularly during the critical period of adolescence when self-concept of ability typically declines (Nagy et al., 2010; Wigfield et al., 1997). Because the development of self-concept of ability has been suggested to be linked to interaction with other people (Dermitzaki & Efklides, 2000), such as parents, the present study examined the development of self-concept of ability in literacy and mathematics among 231 Finnish adolescents from grade 7 to grade 9, and the role that mothers' and fathers' beliefs about their children's abilities play in this development. Also investigated was whether children's gender and level of performance influence the possible associations between parental beliefs and their child's self-concept of ability.

1.1 Self-concept of ability

Recent research has led to an understanding that self-concept is multidimensional and hierarchical in nature and is formed in social comparison and in communication with significant others (Bong & Skaalvik, 2003). Thus, academic self-concept may be different for the domains of mathematics and verbal skills, for example (Arens, Yeung, Craven, & Hasselhorn, 2011). Previous research has shown that mathematics and verbal self-concepts are almost uncorrelated although achievement in mathematics and verbal subjects substantially correlate (Marsh, 1990; Marsh, Byrne, & Shavelson, 1988). The Internal/External Frame of Reference (I/E) Model focuses on explaining why this is. According to the I/E Model academic self-concept in a specific school subject is formed in relation to two comparison processes that are called "frames of reference" (Marsh & Yeung, 2001). In the *external* (normative/social comparison) frame of reference a student compares his/her own performance in a particular domain (e.g. mathematics) with her/his perception of other students' performance in this domain. In the *internal* (ipsative-like) reference a student compares his/her own performance in a particular domain (e.g. mathematics) with his/her performance in other school subjects (e.g. literacy). The actual self-concept in a particular school domain is formed in these simultaneous comparison processes. Thus, if a student is poor in mathematics compared to other students in his/her class (external comparison), but in comparison to his/her performance in other school subjects is doing better in mathematics than in other subjects, his/her mathematics self-concept can be good. Based on the Internal/External Frame of Reference (I/E) Model, as well as previous empirical studies showing that mathematics and verbal self-concept domains are distinct (Arens et al., 2011), in the present study self-concept is approached subject-specifically.

The Expectancy-Value theory by Eccles et al. (1983) provides a theoretical framework for self-concept in the academic setting. According to the Expectancy-Value theory (Eccles et al., 1983; Eccles & Wigfield, 1995; Wigfield & Eccles, 2000) individuals' performance in school and their academic choices are explained not only by the extent to which they value the activity in question, but also by the expectancies they have for success in that activity (Wigfield & Eccles, 2000). According to the theory, students' self-concept of ability, that is, the individual's perception of his or her competence in a certain academic domain, influences the expectancies students have and, through these expectancies, different academic outcomes, such as performance (Wigfield & Eccles, 2000). Theoretically, self-concept of ability is distinct from expectancy of success: self-concept of ability focuses on present ability while expectancies focus on the future. However, empirically these two concepts have not been found to be separate (Eccles et al., 1983; Wigfield & Eccles, 2000).



Previous research has shown that students' self-concept of ability plays an important role in academic environments by directing behavior and effort in learning situations (e.g., Atkinson, 1964; Bandura, 1986; Eccles et al., 1983; Wigfield et al., 2006). Students who believe in their abilities and expect that they can and will do well in a task are much more likely to perform better and to engage in an adaptive manner in such academic tasks than students who do not believe in their abilities and expect to fail in a certain task (Chapman, Tunmer, & Prochnow, 2000; Eccles et al., 1983; Pintrich & Schunk, 2008). Similar results have been found among both younger school-aged children (Chapman et al., 2000) and adolescents (Caprara, Vecchione, Alessandri, Gerbino, & Barbaranelli, 2011; Eccles et al., 1983), and in different academic domains, such as math (Chiu & Klassen, 2010; Eccles et al., 1983) and literacy (Chapman et al., 2000; Chiu & Klassen, 2009). Among adolescents, self-concept of ability has further been found to predict career choices. It has been shown, for example, that students who have greater confidence in their math abilities are more likely to aspire to math-related careers than students whose confidence in their math abilities is lower (Eccles, 2007).

Several studies have shown that the development of self-concept of abilities is a continuous process that starts at the very beginning of the school career. Young students typically have very positive, and even unrealistic, perceptions of their abilities during the first years of primary school (Aunola, Leskinen, Onatsu-Arviolommi, & Nurmi, 2002), but as they grow older, their perceptions of their abilities become more realistic and more negative (Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002). One important phase for the development of self-concept of ability is early adolescence (Preckel, Niepel, Schneider, & Brunner, 2013). During this time, many physical changes and changes in a person's environment and social context take place. At the same time an educational transition usually takes place - the transition to secondary school. This transition means changes in adolescents' everyday social contexts, in the ways adolescents get feedback in school and in their frames of reference (see Wigfield et al., 2006). The rates of self-concept of ability in mathematics and literacy have been shown to decline during elementary and secondary school (e.g. Wigfield, Eccles, Maclver, Reuman, & Midgley, 1991). Because the earlier studies on the topic have mainly been carried out in the US (Eccles et al., 1983; Nagy et al., 2010), Australia (Nagy et al., 2010; Watt, 2004), or Germany (Nagy et al., 2010; Preckel et al., 2013), it is not known, however, whether the results on the tendency of self-concept of ability to decline during the transition to secondary school apply to other cultural and educational settings. Consequently, the first aim of the present study was to examine the developmental changes in self-concept of mathematics and literacy abilities during secondary school in Finland.

The characteristics of the Finnish school system differ from school systems in some other countries. In Finland, children start their education by attending pre-school in the year they turn 6. In the year of their 7th birthday children start compulsory comprehensive school which is divided into a lower level (i.e., elementary school; grades 1-6) and an upper level (i.e., secondary school; grades 7-9). In Finnish secondary schools all students are taught at the same academic level and students do not need to make decisions whether to take higher or lower level courses. This characteristic of Finnish school system is different from, for example, the system in Germany where students need to decide which achievement-based secondary school track they take (Gniewosz & Noack, 2012). Because in Finland the compulsory courses are at the same level for everyone both high- and low-performing students are studying in the same classrooms. Moreover, in Finnish comprehensive school education extra attention is paid to support particularly those students who have difficulties in their learning. The fact that Finnish school system includes well-developed support services for students suffering, for example, from learning difficulties has been suggested to partly explain Finnish students' academic success in worldwide PISA-studies (Väljjarvi et al., 2007). Overall, the fact that in Finland all students are taught at the same academic level independent of their level of performance or motivation and that extra attention is paid to support students with learning difficulties may positively impact the students' self-concept development, particularly among students showing lower performance.



1.2 The role of parents

Previous studies have shown that ability-related self-concepts develop in interaction with one's environment, and are affected by evaluations of and feedback from parents (Bong & Skaalvik, 2003; Eccles et al. 1983; Gniewosz, Eccles, & Noack, 2014; Shavelson, Hubner, & Stanton, 1976). According to the Expectancy-Value model proposed by Eccles and colleagues (1983), parental beliefs about their children's abilities may affect children's self-concept of ability development through at least two mechanisms (see e.g. Eccles, 1993). First, parents may directly tell their children what they think the child is good at (Jacobs & Eccles, 2000). Second, parents can also provide different learning opportunities for their children based on their beliefs about their children's abilities (Jacobs & Eccles, 2000). Children then interpret this information from their parents and incorporate it into their self-concept of ability (Jacobs & Eccles, 2000).

There is also strong empirical evidence for the assumption that parents' beliefs about their children's academic performance affect children's subject-specific self-concept of ability (Eccles Parsons, Adler, & Kaczala, 1982; Frome & Eccles, 1998; Gniewosz, Eccles, & Noack, 2012; Jacobs, 1991; McGrath & Repetti, 2000; Phillips, 1987). For example, parents' beliefs in their child's success in the literacy domain have been found to be positively related to sixth-grade children's self-concept of their literacy ability (Frome & Eccles, 1998). Similar results have been found in the domain of mathematics (Eccles Parsons et al., 1982; Gniewosz et al., 2012). Although the importance of parental beliefs in the formation of children's self-concept of mathematics and literacy ability is widely acknowledged, there is some evidence that the role of parental beliefs in the development of students' self-concept may vary with age (e.g., Gniewosz et al., 2012). For example, Pesu, Viljaranta and Aunola (2016) found that teachers' beliefs played a bigger role than parents' beliefs in first-grade students' self-concept of mathematics and literacy ability development. Gniewosz et al. (2012), in turn, found that the effects of maternal child-related competence beliefs on students' mathematics self-concept increased during the secondary school transition, whereas the effect of grades decreased. Interestingly, after the school transition the impact of maternal competence beliefs decreased and the impact of grades increased. When interpreting the previous results on the topic it should be noted that although longitudinal procedures were applied when predicting children's self-concept of ability by parental beliefs, children's self-concept of ability may also play a role in parental beliefs.

The studies focusing on the role of parental beliefs in students' self-concept of abilities have also found some gender differences. For example, it has been shown that parents typically think that boys are better at mathematics than girls (Eccles Parsons et al., 1982; Eccles & Jacobs, 1987; Gunderson, Ramirez, Levine, & Beilock, 2012), independently of children's actual performance in mathematics (Eccles, 1993; Eccles Parsons et al., 1982). This has been shown to impact girls' self-perceptions in mathematics (Jacobs, 1991). Conversely, parents tend to think that girls do better in literacy (Gniewosz et al., 2014). Although there are studies focusing on these mean-level-differences in parental beliefs concerning boys and girls, less is known, however, whether there is variability in the relations among parental beliefs and their children's self-concept of ability between boys and girls. According to Simpkins, Fredricks, and Eccles (2012) it is important to study whether the associations among the indicators vary as a function of gender because socialization and cognitive theories suggest that the associations are not similar for boys and girls. According to these theories adolescents most likely act in a similar way as people who are most similar to themselves (Maccoby, 1998). This suggests that mothers may have a stronger impact on their daughters than to their sons and fathers on their sons than their daughters (Maccoby, 1998). Furthermore, testing the moderating effect of gender is important because it may have important implications for interventions (Simpkins et al., 2012): if parental beliefs have different impact on boys and girls self-concept of ability, the interventions should take this into consideration when thinking the best ways to support girls and boys. Whether the effect of parental beliefs about their children's abilities on children's self-concept development is affected by the child's gender is thus far, however, underexplored.

Alongside gender it has been recently suggested that the child's level of performance may also impact the association between adults' beliefs and students' self-concept of ability (Pesu et al., 2016). In the study by Pesu et al. (2016), the impact of teachers' beliefs on first-grade students' self-concept of



mathematics and reading ability was different depending on the level of student's performance: among high-performing students, teachers' beliefs had a positive impact on students' self-concept of mathematics and reading ability, whereas among low-performing students, teachers' beliefs did not have this positive impact. Pesu et al. (2016) suggested that one explanation for this differential impact of teacher beliefs is that high-performing children are more prone to be affected by adults' beliefs than low-performing children as (owing to their cognitive abilities) they are able to make more accurate interpretations of adults' feedback and their own performance. Also, Bohlmann and Weinstein (2013) argued that children's cognitive reasoning skills affect the way they perceive, interpret, and attribute meaning to teachers' actions. Thus, it can be that students who have better cognitive skills are better able to interpret adults' feedback overall. However, the differential role that parental beliefs have on student self-concept, depending on the student's level of performance, has not to our knowledge been investigated among older children like secondary school students. Finding out differences in the associations between parental beliefs and students' self-concept of ability depending on students' level of performance might have important implications for interventions.

One further limitation of earlier research is that the majority of studies on the role of parental beliefs have focused on the role of mothers (for exceptions, see Frome & Eccles, 1998; Gniewosz & Noack, 2012; Pesu et al., 2016), to the relative neglect of the role of fathers' beliefs. However, it might be that mothers and fathers play a different role in their children's self-concept development (Frome & Eccles, 1998; MacGrath & Repetti, 2000; Maccoby, 1998). Consequently, the second aim of the present study was to investigate the role of mothers' and fathers' beliefs about their adolescent children's abilities in mathematics and literacy in the development of adolescents' self-concept of ability during secondary school. Further, possible differences in these associations depending on the adolescent's gender, on the one hand, and level of performance, on the other, were investigated.

The research questions were:

- a) To what extent Finnish adolescents' self-concept of mathematics and literacy ability change during secondary school? Based on earlier literature, we hypothesized that self-concept of mathematics and literacy ability decline during grades 7-9 (Nagy et al., 2010; Wigfield et al., 1991).
- b) Do parental beliefs concerning adolescents' abilities predict the development of adolescents' self-concept of literacy and mathematics ability during grades 7-9? We hypothesized that mothers' and fathers' beliefs positively predict adolescents' subsequent self-concept of literacy and mathematics ability (e.g. Frome & Eccles, 1998; Gniewosz et al., 2012).
- c) Are there differences in the associations between parental beliefs and adolescents' self-concept of abilities depending on adolescents' a) gender, b) level of performance? We set two alternative hypotheses concerning the gender differences in the associations. As the first hypothesis, we hypothesized that the associations of mothers' beliefs with adolescents' self-concept of ability are stronger among girls than among boys whereas the associations of fathers' beliefs with adolescents' self-concept of ability are stronger among boys than among girls, as suggested by the socialization model (Maccoby, 1998). As the second hypothesis, we hypothesized that gender does not play a role in the connections between mothers'/fathers' beliefs and self-concept of ability because previous studies have not found these kinds of gender differences (Pesu et al., 2016; Simpkins et al., 2012). Based on previous results by Pesu et al. (2016), we also hypothesized that the role of mothers'/fathers' beliefs in self-concept of ability is stronger among high- than low-performing students.



2. Method

2.1 Participants

The present study is a part of a longitudinal study (the Jyväskylä Entrance into Primary School (JEPS) study (Nurmi & Aunola, 1999–2009)) focusing on students' academic and motivational development from the beginning of the school career until the end of comprehensive school. The sample comprised students from two medium-sized districts (urban or semi-urban areas) in central Finland. The present study focuses on the data obtained from the adolescents and their parents when the former were in the 7th and 9th grades. The participants were 231 students in grade 7 and 221 in grade 9 (in grade 7: 114 girls and 117 boys, in grade 9: 107 girls and 114 boys) and their mothers ($n = 221$) and fathers ($n = 191$). The adolescents filled in questionnaires on their self-concept of ability in the spring of the 7th grade and again in the spring of the 9th grade. Performance in mathematics and literacy was assessed by tests in the spring term of the 7th grade. All questionnaires and tests were performed during regular school hours in classroom group situations by trained investigators. Mothers and fathers were asked to fill in mailed questionnaires concerning their beliefs about their child's performance in mathematics and literacy in the spring of the grade 7. The response rate was 96 % for mothers and 83% for fathers.

The families participating in the study were to some extent more educated than the Finnish population overall (Statistics Finland, 2010): 11.5% of mothers and 12.1% of fathers had no vocational education, 26.6% of mothers and 38.4% of fathers had a vocational education, and 61.9% of mothers and 49.6% of fathers had a degree from an institution of higher learning (e.g., polytechnic) or university. At the beginning of the 7th grade, 68,3% of the children were living in a nuclear family, 13,5% were living in a blended family, and 9,1% were living in a single parent household.

2.2 Measures

2.2.1 *Self-concept of ability in literacy and mathematics*

Students' self-concept of ability in mathematics and literacy was measured with a questionnaire based on the ideas presented by Eccles and Wigfield (1995). Students were asked to answer three questions, separately for mathematics and literacy (How good are you at mathematics / literacy? How good do you think you are at mathematics / literacy compared to the other students in your class? How hard are assignments related to mathematics / literacy for you (revised)) on a 5-point Likert-scale. Self-concept of ability in mathematics and literacy were scored separately by calculating the mean of the three items in each case. The Cronbach's alpha reliabilities for self-concept in mathematics in grade 7 and grade 9 were .87 and .89, respectively, and for self-concept in literacy .81 and .81, respectively.

2.2.2 *Adolescents' performance in mathematics*

Adolescents' performance in mathematics was assessed with the group-administered KTLT test (Räsänen & Leino, 2005), which is a standardized math test for grades 7-9 (13-16 years). The test consists of 40 mathematical tasks (basic calculation and equation tasks, word problems, geometry tasks, measurement tasks), to be done individually. One point was given for each correct answer. The test was administered with a 45-minute time limit. The internal reliability of the test in the present data was .86. The internal reliability of the test in the normative data ($N = 1,157$) has been shown to be 0.88 (Räsänen & Leino, 2005). The test has also been shown to correlate with other measures of mathematical skills ($r = 0.61-0.78$, $p < 0.001$; Räsänen & Leino, 2005).



2.2.3 Adolescents' performance in literacy

Adolescents' performance in literacy was measured by three subtests taken from the Test of Word Reading, Spelling and Reading Comprehension (Holopainen, Kairaluoma, Nevala, Ahonen, & Aro, 2004):

- a) In the first spelling error task, participants were asked to mark with a vertical line on 100 words typed on a sheet of paper as many spelling errors (an extra, missing, or wrong letter in a word) as they could identify in 3.5 minutes. The score was the number of correctly detected errors. The test-retest reliability for the subtest has been shown to be 0.83 (Holopainen et al., 2004).
- b) In the second word chain test, the participants were asked to separate understandable words in a word chain by drawing a line between the words. A total of 100 words were presented in chains of four words with no spaces between them. The adolescents were allowed 3.5 minutes to find the end of one word and the beginning of a new word in each chain and to mark it with a vertical line. The test was scored as the number of correctly found words. The test-retest reliability of the subtest has been shown to be 0.84 (Holopainen et al., 2004).
- c) In the reading comprehension test, the participants were asked to read a four-page long story (*The Hounds of the Village*, written by Finnish author Veikko Huovinen), in which 52 words had been changed so that they did not fit in with the story (i.e., they were in contradiction with the meaning of the sentence, paragraph or larger text context). The participants were asked to underline all the inappropriate words they could find. A point was given for each correctly underlined word. The time limit for the subtest was 45 minutes.

The sum score of the standardized three subtest scores was taken as the measure of literacy performance. The Cronbach's alpha reliability of the sum score was .81.

2.2.4 Mothers' and fathers' beliefs about their child's performance in literacy/mathematics

Mothers' and fathers' beliefs were measured at the end of the 7th grade with 2 items (e.g. *How well do you think your child is doing in literacy/mathematics at the moment? How well do you think your child will do in literacy/mathematics in the future?*) using a 4-point Likert-scale. The Cronbach alpha reliabilities of the scale were .92 (literacy) and .93 (mathematics) among mothers and .92 (literacy) and .93 (mathematics) among fathers.

2.2.5 Analyses strategy

The analyses were carried out along the following steps. First, the developmental changes in adolescents' self-concepts of mathematics and literacy abilities from grade 7 to grade 9, and possible gender differences in these changes, was investigated by repeated measures ANOVA. Second, hierarchical regression analyses were carried out to examine whether parents' beliefs about their adolescent children's abilities in mathematics and literacy play a role in the development of adolescents' self-concept of mathematics and literacy ability during secondary school and whether the role of parental beliefs differs according to the adolescent's gender or level of performance. In these analyses, adolescents' self-concept of ability in a specific school subject in the spring of the ninth grade (Time 2) was predicted by their self-concept of ability in that subject in the spring of the seventh grade (Time 1), academic performance in that subject in the seventh grade (Time 1), gender, and mothers' or fathers' beliefs about their child's abilities in the spring of the seventh grade (Time 1). Each variable was entered stepwise in the analysis. The effects of mothers' and fathers' beliefs were tested in separate analyses. In order to determine whether any connection existed between mothers'/fathers' beliefs and the adolescents' subsequent level of self-concept of ability was influenced by the adolescents' gender or by the adolescents' level of performance, the related interaction terms (Gender X Belief or Academic Performance X Belief) were added to the analysis in the last step. Each interaction term was tested in a separate analysis. The analysis was carried out separately for self-concept of mathematics ability and self-concept of literacy ability. In order to be able to examine the effects of the



interaction terms, all the predictor variables were standardized before being added to the regression models and before calculating any interaction terms. The missing data was handled pairwise.

3. Results

The means (M), standard deviations (SD), and Pearson product-moment-correlations of the study variables are shown in Table 1.

The results of repeated measures ANOVA showed that adolescents' self-concept of mathematics ability slightly declined from grade 7 ($M = 3.41$, $SD = 0.82$) to grade 9 ($M = 3.30$, $SD = 0.94$; $F(1, 202) = 5.87$, $p < .05$). Their self-concept of literacy also slightly declined during this period (Time 1: $M = 3.54$, $SD = 0.70$; Time 2: $M = 3.44$, $SD = 0.72$; $F(1, 203) = 3.86$, $p = .05$). Self-concept of literacy ability was higher among girls than boys across the measurement points ($F(1, 202) = 21.14$, $p < .001$), whereas self-concept of math ability was higher among boys than girls ($F(1, 202) = 6.23$, $p < .05$). No gender differences in the change in self-concepts from grade 7 to grade 9 were, however, evident.



Table 1
Intercorrelations, Means, and Standard Deviations for the study variables

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Self-concept Literacy T1											
2. Self-concept Literacy T2	.48 ^c										
3. Self-concept Math T1	.12	.20 ^b									
4. Self-concept Math T2	.08	.29 ^c	.71 ^c								
5. Performance Literacy T1	.38 ^c	.45 ^c	.23 ^b	.23 ^b							
6. Performance Math T1	.26 ^c	.27 ^c	.59 ^c	.51 ^c	.60 ^c						
7. Gender	-.21 ^b	-.32 ^c	.17 ^b	.14 ^a	-.36 ^c	.00					
8. Mother belief Literacy T1	.46 ^c	.40 ^c	.29 ^c	.23 ^b	.57 ^c	.46 ^c	-.30 ^c				
9. Mother belief Math T1	.09	.16 ^a	.64 ^c	.62 ^c	.39 ^c	.64 ^c	-.01	.53 ^c			
10. Father belief Literacy T1	.35 ^c	.35 ^c	.25 ^b	.24 ^b	.51 ^c	.48 ^c	-.28 ^c	.56 ^c	.38 ^c		
11. Father belief Math T1	.01	.06	.54 ^c	.55 ^c	.32 ^c	.56 ^c	.02	.40 ^c	.67 ^c	.58 ^c	
<i>M</i>	3.56	3.47	3.36	3.30	46.34	21.52		2.90	2.76	2.87	2.84
<i>SD</i>	.69	.74	.84	.94	14.43	6.33		.79	.80	.69	.76

Note. ^a = $p < .05$. ^b = $p < .01$. ^c = $p < .001$.

T1 = time 1, T2= time 2



3.1 Math-related self-concept

The results of the hierarchical regression analyses for mathematics-related self-concept (see Table 2) showed, first, that individual differences in self-concept of mathematics ability were relatively stable from grade 7 to grade 9. Second, mothers' ($\beta = .28, p < .001$) and fathers' ($\beta = .22, p < .001$) beliefs about their child's abilities predicted adolescents' subsequent self-concept of mathematics ability at the end of grade 9, after controlling for the previous levels of self-concept of mathematics ability and mathematics performance: the higher the beliefs parents had about their child's mathematics ability in grade 7, the better the adolescents' self-concept of mathematics ability was in grade 9. Finally, the connections between adolescents' self-concept of mathematics ability and mothers' belief in mathematics was found to be different depending on the adolescent's level of mathematics performance ($\beta = .13, p < .01$). To examine this interaction effect further, Aiken and West's (1991) procedure was used. In this procedure, simple slopes for the mothers' belief variable in the prediction of adolescents' mathematics self-concept were calculated and presented using standardized scores separately for adolescents who showed either low ($-1 SD$) or high ($+1 SD$) levels of mathematics performance. The results are shown in Figure 1. The results showed that among high-performing adolescents, mothers' beliefs positively predicted subsequent self-concept of mathematics ability, whereas among low-performing adolescents this positive effect of mothers' beliefs was weaker. The impact of parental beliefs was similar for boys and girls.

Table 2

The Results of Hierarchical Regression Analyses for Mathematics Related Self-Concept at Time 2 (Standardized Betas)

Predictor	Mathematics Related Self-Concept at Time 2				
	Step1 β	Step2 β	Step3 β	Step4 β	Step5 β
A. Self-concept (Time 1)	.71***	.71***	.62***	.50***	.47***
B. Gender		.02	.04	.06	.07
C. Performance (Time 1)			.14*	.03	.06
D. Beliefs					
D1. Beliefs mother (Time 1)				.28***	.30***
D2. Beliefs father (Time 1)				.22**	.23**
E. Interaction Terms					
B X D1					-.16
B X D2					.05
C X D1					.13**
C X D2					.04
	$R^2 = .51$	$R^2 = .51$	$R^2 = .52$	$R^2 = .55-.56^1$	$R^2 = .55-.57^1$

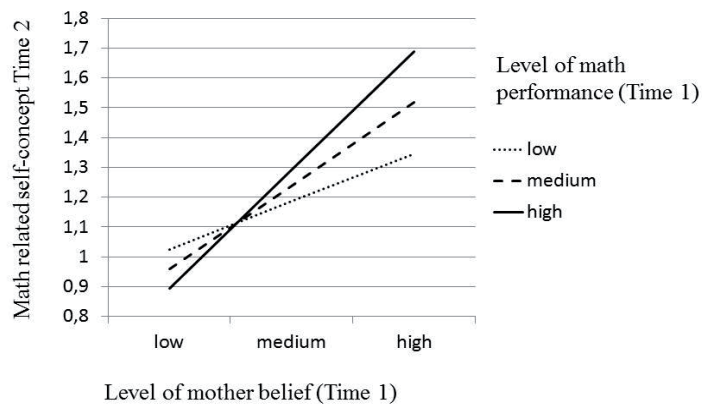
Note 1. *** $p < .001$, ** $p < .01$, * $p < .05$

The effects of mothers' and fathers' beliefs were each tested in separate analyses. Similarly all interaction terms were tested in separate analyses.

¹ R^2 varies depending on which variables are included into the model as predictor variables.



Figure 1. The impact of mothers' beliefs on students' mathematics related self-concept among low, medium and high-performing students



3.2 Literacy-related self-concept

The results of hierarchical regression analyses (see Table 3) showed, first, that individual differences in self-concept of literacy ability were relatively stable through grades 7-9. The results showed further that, after controlling for the previous level of self-concept and literacy performance, mothers' or fathers' beliefs did not predict adolescents' self-concept of literacy ability. No Parental Belief X Gender or Parental Belief X Performance interaction effects were found either.



Table 3

The Results of Hierarchical Regression Analyses for Literacy Related Self-Concept at Time 2 (Standardized Betas)

Predictor	Literacy Related Self-Concept at Time 2				
	<i>Step1</i> β	<i>Step2</i> β	<i>Step3</i> β	<i>Step4</i> β	<i>Step5</i> β
A. Self-concept (Time 1)	.48***	.43***	.34***	.32***	.32***
B. Gender		-.23***	-.15*	-.15*	-.15*
C. Performance (Time 1)			.27***	.24**	.24**
D. Beliefs					
D1. Beliefs mother (Time 1)				.08	.08
D2. Beliefs father (Time 1)				.08	.09
E. Interaction Terms					
B X D1					.21
B X D2					.03
C X D1					.02
C X D2					.08
	$R^2 = .23$	$R^2 = .28$	$R^2 = .33$	$R^2 = .34$	$R^2 = .34$

Note 1. *** $p < .001$, ** $p < .01$, * $p < .05$

The effects of mothers' and fathers' beliefs were each tested in separate analyses. Similarly all interaction terms were tested in separate analyses.

4. Discussion

The present study aimed to contribute to the literature on students' self-concept of ability by examining, first, to what extent developmental changes in self-concept of mathematics and literacy abilities occur among Finnish students across secondary school and, second, what role mothers' and fathers' beliefs play in the development of adolescents' self-concept of mathematics and literacy ability during this period. Furthermore, whether the possible associations of parental beliefs with adolescents' self-concepts of abilities are influenced by adolescents' gender or level of performance was investigated. The results showed first that both self-concept of mathematics and literacy ability slightly declined during secondary school. Second, mothers' and fathers' beliefs about their child's abilities predicted changes in the adolescents' self-concept of ability, but only in mathematics: the higher the beliefs parents had about their child's mathematics ability in grade 7, the better the adolescents' subsequent self-concept of mathematics ability was in grade 9. Furthermore, the role of mothers' beliefs in adolescents' self-concept of mathematics ability was found to be particularly strong among those adolescents who showed a high level of mathematics performance. Finally, gender did not have an effect on the connections between parental beliefs and adolescents' self-concept of ability development in mathematics or literacy.

4.1. The Development of Self-Concept of Ability

The results of this study showed first that adolescents' self-concept slightly declined during secondary school among both girls and boys. This result is consistent with previous results reported among US (Nagy et al., 2010; Wigfield et al., 1991), German (Nagy et al., 2010) and Australian students (Nagy et



al., 2010) and suggest that also in the Finnish context the secondary school years are an important time for the development of self-concept. The period of the transition to secondary school brings many changes in adolescents' lives. Their everyday social contexts change, the ways they get feedback at school change, and their frames of reference change (see Wigfield et al., 2006). It is noteworthy, however, that in the present study the decline in self-concept was only minor. One explanation for there being only a slight decline in self-concept can be found in the Finnish national curriculum guidelines, according to which teachers should focus on motivating both boys and girls equally to learn and to help them build a positive self-concept. Thus, it is possible that since Finnish teachers are aware of the importance of supporting self-concept construction, students receive much support from their school in this area, and thus show less of a decline in self-concept during adolescence.

4.2. The Role of Mothers' and Fathers' Beliefs in Self-Concept of Ability Development

The results of the present study showed further that mothers' and fathers' beliefs predicted students' self-concept of mathematics ability development across secondary school: the higher parental beliefs at the beginning of secondary school, the higher the adolescent's self-concept in mathematics at the end of secondary school. The results are in line with Eccles et al.'s Expectancy-Value theory which suggests that parental beliefs affect their children's self-concept of ability (Eccles Parsons et al., 1982; Frome & Eccles, 1998; Lau & Pun, 1999; McGrath & Repetti, 2000). Previous empirical research on the role of parents in students' self-concept of ability development, however, has mainly focused on the role of mothers' beliefs whereas that of fathers' has received less attention. However, there is some evidence that mothers and fathers both play a role in their children's self-concept of ability development in both mathematics and literacy (Frome & Eccles, 1998; Gniewosz et al., 2014) at least among sixth-grade students (Frome & Eccles, 1998) and fifth- to seventh-graders (Gniewosz et al., 2014). The results of the present study also indicate that in secondary school both mothers' and fathers' beliefs have an impact on adolescents' self-concept of ability in the domain of mathematics. This result adds to the literature since previous studies on the role of parents have not focused on this particular age group.

However, the present results are inconsistent with those of previous research insofar as mothers' and fathers' beliefs did not play a role in their adolescents' self-concept development in the domain of literacy. There are several possible explanations for this result. First, it is possible that achievement feedback is less clear in literacy than in mathematics, which would help explain why parents had a more evident role in adolescents' self-concept development in mathematics. Another possibility is that because mathematics is typically considered a more difficult school subject than literacy, and because there is a clearer declining trend in the self-concept of mathematics ability, the self-concept of mathematics ability is particularly prone to external feedback. Third, previous studies showing connections between parental beliefs and their children's self-concept of ability development have been conducted in cultural settings other than Finland. Research has revealed that Finnish children attain fluency in native language reading and writing earlier, by the end of the first school year (Seymour, Aro, & Erskine, 2003) than for example English-speaking children, whose rate of literacy skills development is more than twice as slow (Seymour et al., 2003). Slower literacy skills development has been attributed to fundamental linguistic differences in syllabic complexity and orthographic depth (Seymour et al., 2003). For this reason, Finnish parents might involve themselves less in their children's literacy-related studies than mathematics studies, also later on. Thus, parents might have less information about their children's success in literacy than in mathematics and thus less influence on their children's self-concept in literacy than in mathematics.

The results of the present study showed, finally, that the role of mothers' beliefs about their adolescent child's mathematics ability was dependent on the level of the adolescent's performance: mothers' beliefs were positively related to their children's self-concept of mathematics ability among high-performing adolescents but less so among low-performing adolescents. These results are in line with the results of Pesu et al. (2016), who found that the role of teachers' beliefs on first graders' self-concept of mathematics and reading ability differed depending on the level of the student's performance: teachers' beliefs had a positive



impact on students' self-concept of mathematics and reading ability only among high-performing students, not among low-performing students. There are several possible explanations for this result that mothers' beliefs play a role, particularly among high-performing children. First, it might be that mothers communicate their beliefs, even where they are equally positive, differently to children whose levels of performance are different. Thus, the effect of mothers' beliefs would be different for children who perform differently at school. Second, it could be that students interpret mothers' cues about their beliefs differently depending on their level of performance. Bohlmann and Weinstein (2013) argued that children's cognitive abilities influence their perceptions and interpretations of teachers' actions. It is possible that children's cognitive abilities influence their perceptions of external feedback overall. Thus, it could be that high-performing adolescents are cognitively better able to accurately perceive and interpret mothers' beliefs (see also, Pesu et al., 2016).

The present study showed that gender had no effect on the development of self-concept of ability in either mathematics or literacy. This result is consistent with previous studies showing similar patterns in the development of self-concept in boys and girls (e.g. Nagy et al., 2010). The results of the present study showed further that gender did not influence the relationship between mothers' and fathers' beliefs and adolescents' self-concept of ability development. Since Finland can be considered an egalitarian culture (Chiu & Klassen, 2009; Chiu & Klassen, 2010), there might be fewer gender differences overall. In an egalitarian culture, individuals are taught to view, value, and act towards one another as equals based on their common humanity (Chiu & Klassen, 2009; Chiu & Klassen, 2010). People learn these practices and values through formal and informal socialization, including through schooling (Chiu & Klassen, 2009; Chiu & Klassen, 2010). Finnish culture is also considered as having little characteristics of a masculine culture (Chiu & Klassen, 2009; Chiu & Klassen, 2010). In masculine cultures males are typically favored in higher status roles, and women have lower income (Cheung & Chan, 2007). Because gender roles are rigid in masculine cultures, this may lead, for example, girls to value mathematics learning less, devote less time to studying mathematics and have lower mathematics self-concept than boys (Hofstede, 2003; Wigfield, Tonks, & Eccles, 2004). As Finland is considered an egalitarian and less masculine culture than many other cultures (Chiu & Klassen, 2009; Chiu & Klassen, 2010), Finnish children grow up in a society where boys and girls are treated more equally than in cultures that are less egalitarian. This may explain why the present study did not show any gender differences in girls' and boys' self-concept of abilities and why the impact of parental beliefs was similar for boys and girls.

4.3. Limitations




This study has its limitations. First, the study was carried out in just one educational setting, Finland. As it is possible that parental beliefs play a different role in students' self-concept of abilities in different educational settings and cultures, further cross-cultural research on the topic is needed. Second, even though a longitudinal procedure was used in the present study, it might be that some third factor not controlled for explains the predictions found. One should, therefore, be cautious before making any judgements about the possible causality of the results. Third, the measure for mothers' and fathers' beliefs included two questions only. In future research measurements including more items to measure parental beliefs should be used to replicate the results found here.

Overall, the results of this study suggest that during secondary school Finnish adolescents' self-concepts of mathematics and literacy ability undergo a slight decline, and that in the domain of mathematics both mothers' and fathers' beliefs about their children's abilities play a role in the development of adolescents' self-concept of ability. It is important that both mothers and fathers know what role they play in the formation of their children's self-concepts of ability. Because parents receive information about their children's success at school indirectly, i.e. via grades and feedback from teachers, they might tend to think they do not have much of a role in their children's academic-related life. It is important that schools and teachers in particular inform parents about the crucial role they can have on their children's self-concept development in different academic domains. Teachers and school personnel should inform parents about the



ways in which they, both mothers and fathers, could support their children and their children's developing self-concepts.

Keypoints

-  Mothers' and fathers' child-specific ability beliefs predicted adolescents' self-concept of mathematics ability.
-  Mothers' and fathers' beliefs did not predict adolescents' self-concept of literacy ability.
-  The relations between mothers' beliefs and adolescents' self-concept of mathematics ability varied according to adolescents' performance: mothers beliefs were positively related to their children's self-concept of mathematics ability among high-performing adolescents but less so among low-performing adolescents.

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III

THE ROLE OF MOTHERS' BELIEFS IN STUDENTS' SELF- CONCEPT OF ABILITY DEVELOPMENT

by

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